Hugh Cecil Earl of Lonsdale

175 Hippodonomia, or the true structure, laws, and economy of the horses foot: Also Podophthora, or a ruinous defect in the principle of the common shoe detected; and demonstrated by experiments; with a proposition for a new principle of shoeing, which abundant practice has since confirmed. By **Bracy Clark**, F.L.S., Member of the Royal Institute of France; of the Royal Society of Berlin and Copenhagen; Royal Agricultural Society of Stutgard; and Honorary Member of the Natural History Society of New York, etc.

Naturam Ferro expellas usque dum non recurret.

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Pl. I.

FIG. I.

THE NATURAL FOOT OF THE HORSE.

Sydm Edwards Delt. Pub. by B. Clark. Giltspur Street London Octr. 1. 1809. Milton Sculp.

HIPPODONOMIA,

OR

THE TRUE STRUCTURE, LAWS, AND ECONOMY, OF THE HORSE'S FOOT:

ALSO

PODOPHTHORA,

OR

A RUINOUS DEFECT IN THE PRINCIPLE OF THE COMMON SHOE DETECTED; AND DEMONSTRATED BY EXPERIMENTS:

WITH

A PROPOSITION FOR A NEW PRINCIPLE OF SHOEING, WHICH ABUNDANT PRACTICE HAS SINCE CONFIRMED.

BY BRACY CLARK, F. L. S.

Member of the Royal Institute of France; of the Royal Society of Berlin and Copenhagen; Royal Agricultural Society of Stutgard; and Honorary Member of the Natural History Society of New York, &c.

Naturam *Ferro* expellas usque dum *non* recurret.

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PREFACE.

About seven years ago, whilst pursuing some experiments on the contracted feet of horses, it occurred to me that the causes usually advanced to explain this serious imperfection were not real; and that, in fact, the accidents, carelessness, idle habits, and wanton tricks of the smith, so much inveighed against, had very little concern in its production. The efficient cause began to appear to me to lie much deeper, and to consist in the very method itself by which the shoe was affixed to the foot.

To establish this opinion by the unerring evidence of experiment seemed difficult; yet a plan for effecting this purpose shortly after suggested itself, and a subject exceedingly well fitted for its application soon offered. I have thus been enabled to place this opinion beyond the reach of doubt. A detail of those experiments will be found in the following pages; and the train of consequences which terminate in the partial destruction of the foot, and proceeding from the continued operation of the same cause.

After having well considered these facts, and reflected on the great obscurity which has hitherto prevailed in this branch of veterinary science, I imagined that these discoveries might be worthy the attention of the public; especially as, the cause of this chief defect being now understood, little would remain in the art of shoeing that did not admit of easy solution. I further hoped that, by doing this, I might excite such efforts as would crown with success the attempt to remove the evil, by introducing shoes of a different construction. The few experiments which I have been able to make lead me to conjecture that it cannot be long ere this will be accomplished. Whatever may be the result in regard to this

conjecture, the clear and intelligible exhibition of the cause of so much mischief and suffering, cannot be of trifling importance: for men are not likely to endeavour to avoid that, of the danger of which they are not sensible. And I have now the satisfaction of observing in this second edition, the first having been published about twenty years ago, that this conjecture has been fully verified, and more than one shoeing establishment is now in extensive operation in this metropolis, giving, by a yielding shoe, relief to hundreds of horses from these cruel and ruinous measures.

The present method of shoeing was, I apprehend, first introduced about twelve or thirteen hundred years ago, and has continued to this day without any very material changes in it, and apparently without any suspicions being entertained of the fact which I am about to expose, at least any consistent demonstrative evidence of it, as far as my knowledge extends; the obvious abuses in the practice of this art having chiefly attracted the notice of those who have written on these subjects.

Tenderness before, exists among horses in different degrees so universally, that every man accustomed to riding looks for it, and uses his precautions accordingly; nay, so frequent is it, that it is regarded by some as almost natural to the animal; and it is also a matter which the *knowing ones in horse-flesh*, as they are sometimes termed, are not displeased with: they pick up a cheap horse that has fallen down, or been sold with loss, on account of his tripping dangerously—one which, from his high value, they could not otherwise obtain; and by severity of bitting, and by tormenting him with the whip, or spur, or both, (continually inflicting pain, or supporting the apprehension of it,) they conceal, and overcome as it were, the suffering of his feet, and escape the mischiefs to which others, using means less cruel, might be exposed. Such is the merciless system which practice has taught them for rendering useful horses so mutilated. And many also, in the superior conditions of life, are frequently expending large sums of money in order to obtain the healthful and agreeable services of these animals, in riding on

horseback, or being drawn in a carriage; yet are they but too frequently, in a little time, owing to the difficulties thrown in their way, obliged to abandon them from their almost perpetual interruptions, accidents, or vexations, and this from causes they are altogether unable to understand or contend against, and which will be seen chiefly to arise from the defective principles and injurious effects of the shoeing, and of which stable-men and smiths take advantage, and increase their power, and this without understanding, as they are supposed to do, the true source of these difficulties. I may also remark, that in writing this treatise, it has not been easy to find language to express these things; for, hitherto, the language of disguise has been purposely used to conceal and cloak them from public view, and to turn away and divert the attention.

In determining these matters by actual experiment, there will be found some novelty, as experiments have not before been introduced into this art; nor was it even supposed to be susceptible of elucidation by such means; presumptuous opinions, or more frequently sturdy assertion, having stood in lieu of these, and materially opposed the progress of this species of knowledge: but if what is here advanced be true, it will be found to subvert nearly all that has been done upon the subject, and to open almost an entirely new prospect on these things.

I cannot forbear offering a remark in this place respecting the veterinary profession, independent of the subject of shoeing, in order to give encouragement to those that are engaged in it, who may at present find it full of difficulty; and to the public, who may be inclined to withdraw their support, as if it were a hopeless profession. There is no art, it may be maintained, so perplexed and difficult, that by human industry and research, steadily and properly exerted, cannot be rendered more clear and practicable: to accomplish this, however, time must be allowed. Public institutions in themselves cannot, it is obvious, create knowledge; they can only afford convenient opportunities for study to those who are disposed to employ

them; and it must still be from individual exertion that improvements will spring. When a few advances have been made beyond the present state, the progress will be probably more rapid, and its service to the horse and to mankind will assuredly be felt. Many disappointments have without doubt arisen from unfounded expectations of relief in desperate and hopeless cases where art could not avail; and some, not finding their interest served in this respect, have become rancorous enemies to the establishment and the profession. The fruit has been sought before the blossom was unfolded. Still there can be no doubt that if human medicine and surgery have been aided by public establishments, the veterinary art must admit of improvement by the same means.

It is with pain, however, I have to record, in publishing this second edition, that now the mystery has been unfolded, and the difficulty exposed nearly twenty years, the greatest obstacle to its general acknowledgment and diffusion has originated with that very school founded for promoting horse knowledge, though I had taken every care to avoid giving offence,—so dangerous are institutions, and protected incorporations of men, who have interests at variance with the science they profess, and who view invidiously any knowledge or discovery not originating with themselves.

Many promising young men were engaged in this profession at the first establishment of the college, who would have succeeded in any of the common occupations of life, but who have sunk under the difficulties of this. The obscurity of some cases, and the irremediable nature of others, with the obstinate opposition of persons interested in the support of darkness, have been so adverse to success, that they have fallen sacrifices to them. Of myself, I may remark, that I have with difficulty persevered under the various discouraging circumstances to which I have been exposed; but at length surmounted several of them, I shall not be deterred from the exercise of this profession while health and strength remain. Whenever I may think that small advances have been made, I

propose to give to the public the result of my inquiries; provided they should meet with a favourable reception, and defray the expenses incurred in printing them.

I am quite at a loss to guess what I have done to offend those personages, the professors of the various veterinary colleges; but by nearly all have I been treated basely,—concealing my discoveries from their pupils, and by endeavouring to traduce and misrepresent them. Professor Coleman, in a most unprovoked manner, has done this; and though he dared not make any open manly attack, which would have been quickly answered, he has to his pupils in secret used all the little arts of defamation, and has nearly prevented, through his agents thus misled, and who scattered this poison of their prejudice through the country, what little advantages I might have derived by the sale of my work, or rather of obtaining some small portion of reimbursement for my many expenses in pursuing these subjects, in doing which I seldom flinched, as will be seen, at any cost that appeared to be required for ascertaining or clearing up a doubtful point. In my first edition, though his work lay before me, a tempting object for remark and criticism, I used him with much delicacy, that I might not injure a school I ardently wished to see flourish: if I spare, therefore, those compliments now, in this present edition, I shall not descend to low abuse or retribution for such very unmerited treatment. He has indeed often insinuated that I was an enemy to the college: I am certainly the enemy of no college, nor of any individual; and may I not say my labours have been directed for the general good in elucidating these arts, and for the use and advantage of all who practise or profess them.

Professor Girard, of the Alfort school near Paris, has, with more candour than my countrymen, very handsomely complimented this work on the foot, in the second edition of his *Traité du pied du Cheval;* but afterwards insinuates, in a very loose, vague manner, that it received help from some one in France: this I should have acknowledged with great pleasure had it been so; but certain it is

that I had great difficulty in getting this work understood there: but that I derived any help in the matter of it, he will easily see could not be the case if he compares it with the original, published six years before in England, and he will then find that many useful passages were omitted from the difficulty of translating them. If the new arrangement in that translation is the thing alluded to, I may assure him it was wholly my own, and he has been imposed upon, if any one has really insinuated to him the contrary. I wrote that part of it exactly as it now stands in the translation, and M. Mazion, the Curè of Fourqueux, near St. Germains, translated it, but with great difficulty, from not knowing the subject, whilst I resided in his house, during two or three weeks, and assisted him; and the first, or introductory part of it, was translated by my brother-in-law, J. J. Secretan, in England, and was taken over to France. A quotation, indeed, I thought I observed among the Latin writers, alluded to in the Essay "*On the Knowledge of the Ancients respecting Shoeing*," which might have been added by Professor Huzard in printing it; but excepting this, I know of nothing that could be so interpreted, and if this had been omitted, the proofs would have been equally decisive of the end proposed in this dissertation. And as to Lafosse, if any one will read him attentively and altogether, they will, I think, come to the conclusion, that so far from borrowing from him, I have allowed him to know what he really never understood; or why did not his countrymen understand it before I published, and have practised shoeing with a motion for the foot long ago? but it was the business of these colleges formerly to depreciate Lafosse, till I praised him as making the only step that had been made, though a false one: for certain it is, that by his false doctrine about frog-pressure, he did a great deal of harm, and the effects of it are still felt by thousands of men and horses, both in England and in France, at this day.

EXPERIMENTS

ON

THE FOOT OF THE HORSE.

CHAP. I.—*The views commonly entertained of the cause of these defects in the going of horses by various characters supposed from their habits to have a knowledge of these things. The views also of the more enlightened. Various principles of shoeing, as they are called, examined;* GOOD *and* BAD *Shoeing; One principle only,—that defined. An experiment undertaken and executed in illustration of the effects of Shoeing.*

THERE is nothing can retard the advances of any art more than too much apprehension about its mysteries and difficulties. The art of nailing iron to horses' feet for their defence is in itself sufficiently simple; a view of the process would show it; the readiness with which those who practise it attain the art would also evince it.

The consequences entailed by a long continuance of this procedure it is that affects the feet; and the public, finding defects in their horses' going from causes which were not at once apparent, have acquiesced in the mysterious nature of this art, which we hope to be enabled, in the following pages, to develope sufficiently for every one to have a right apprehension of it.

This tenderness in the fore feet of horses, and especially in the saddle horses, from its varying in the same animal so much, has created great embarrassment; and some are so differently affected to

others, that it has added to the intricacy of it. Some horses are continually tripping without ever falling; others are bolder in their step and appear less affected, but fall at once and with more serious consequences; others are only brought to stepping shortly; others go wholly on the toe, as the shoe if examined evinces; these arise from the same cause operating on different feet and different constitutions of the horse; the autumnal season, from its weakening influence on horses, will subject them to feel it more, and render them at this season liable to more casualties, though no season is exempt.

There is often, I have observed, much shyness in speaking of these things among men, for fear these errors should be imputed to a want of jockeyship; and few inquiries are made about them for the same reason: no man likes to make inquiries about horses, for that would imply a want of knowledge.

Another of the strong causes which have tended to keep this matter in obscurity, has been the great repugnance which individuals have to admit any thing which tends to diminish the value of their animal, especially if they had any intention of selling him; therefore dealers and jockeys treated the defect in the lightest way possible, and even denied the truth of its existence. The fear also of being regarded as a bad horseman, and wanting address to keep the horse up, leads others to the same conduct of not admitting it. When, however, circumstances of this sort have not existed, it has not been difficult to get an avowal from reasonable persons of the truth of this position. And my own experience in riding very many horses has but rendered me too much a witness of this tenderness, and which by others less acquainted with the nature of it, has been often followed by consequences the most lamentable, and has never failed to lead to the early misery and premature destruction of the horse himself. If it was not so, why use rending bits and cruel irons, whips and spurs, to an animal that in a general way would be easily led by the smallest cord when in health and free from pain? It is by

these irons that they hope to arrest the attention of the horse, and keep him from too much regarding the feelings of his feet: without this tenderness they would certainly not be necessary. And the cunning grooms, generally on these occasions, if such accident should happen, throw the fault of the horse upon the rider, by saying, (if it is not to himself that it has happened) that "he has thrown his horse down," as though the horse's fault was not of himself, but somehow the fault of the rider. In following this change in the feet attentively, we may perceive that from time to time, at different periods of his early life, that it is accompanied with the most extreme distress and weakness upon the limbs, of which the rider, however deficient in feeling, cannot but be sensible, and which neither the whip nor the spur can keep him many yards from becoming ready to drop: in some journeys we have had, we have felt this with indescribable anguish, and the more, perhaps, from knowing the real cause of it.

Accidents also are by no means rare: neither nobility, wealth, nor even royalty itself, are exempted from them, and which will happen in spite of all the advantages of their situation.

The dreadful fall of Lord Deerhurst, by which he lost both his eyes; of the Marquis of Tavistock; of the Marquis of Thomond; and of others, are yet presented to the remembrance of our contemporaries: and William the Conqueror himself, after all his toils, fatigues, and dangers of war, found his death in the fall of his horse; having been thrown forwards upon the pommel of the saddle, he was so bruised that he died of the injury. This accident, by the monkish historians of the time, was imputed to a judgment from Heaven upon him, as a punishment for his cruelty in burning down the town of Mantes in Normandy; others said, the horse put his foot on a live cinder of the burning town, which it is very unlikely he could have felt through his shoe and hoof, or which if he felt, there was nothing to prevent his removing away from: whichever of these causes it was, it is a singular circumstance, and worthy of remark, that he was, as there is every reason to believe, the first who introduced the present

mode of fettering horses' feet into England, and was one of the first victims of the art he introduced.

No one, I believe, will have the hardihood to deny the danger of mounting horses thus mutilated. Among my acquaintance and friends I could relate many instances of miserable accidents, and the newspapers are furnishing plenteous proof every day, in support of this assertion. The appearance also of broken knees proclaim everywhere the little assurance there is on feet that have been so ignorantly treated.

A very large coach proprietor in London, (Willan,) struck with the misery of the bearing rein, and perhaps a broken jaw or two, ordered all his horses to be freed from them. On being put to work, the accidents with their knees became so extensive, that he was again compelled to relinquish his humane endeavours, and resort to this most cruel alternative, at least as it is often made use of.

The present system of shoeing, and its consequences, ruin such multitudes of horses, that surely the discovery of its cause, beyond the power of denial, cannot but be of the highest importance in the affairs of mankind; as well also as on account of the sufferings of the animal; for not one in thirty of all that are raised live to see the half of their natural life expended!

I have also remarked, that the most frequent accidents happen to the horse about the fifth year of his age, and which has appeared to me to arise from this cause,—that the great conflict between the iron and the foot arrives at its height about this period, and that after this the poor sufferer learns to go in a manner that is more suited to his actual condition, that is, with a shortened step, humouring the state of the parts, and in which there is less danger of falling; and the foot after this period yields a more passive submission to the overpowering effects of the iron and nails.

The different form of the shoe which by hand are never made twice alike, and the different direction of the nails, which no one can certainly direct, or know whether bent or straight in passing through

the hoof, will also occasion endless difference even in the best hands. All these causes, simple as they may appear, had cast a formidable and almost impenetrable veil over these arts.

There is also other ways of viewing these things, and entrapping the understanding, rather than entering into a troublesome inquiry about them; and if a complaint is made of the bad going of the horse, it is easily stated that it arises from too hard service; or if it be in great towns, that it is their going on the stones. Yet do we find these defects as frequently in the country as in towns, and as often among horses which are hardly used at all as with those which are fully employed.

If the stable-keeper is asked why his horses are so tender before? and why there needs so much trouble to keep them up—so much so, that all pleasure in riding is destroyed? his answer is, "Why, horses to be sure will by use become leg-weary, and every one who knows any thing about horses knows that well enough;" and with a smile at the simplicity of the inquirer, he quits the subject.

If any one, not having the usual awe of this character, should ask the coachman why he wants two or three kinds of irons to be put in his horse's mouth, his answer will be, "Why, would any one be so mad as to attempt to drive without them?" Then if you are apprehensive of your horses' falling,—what is the cause of this? "Go ask the smiths; they can tell you better about it—they don't shoe them safely."

If the shoeing-smith be inquired of respecting this matter, and how does the horse become tender?—"Why, it is to-be-sure from always standing in the dry litter of the stables; and that is plain enough, for the hind feet are never affected, because they are more in the dung and moisture, which makes it clear enough;" and thus this business is disposed of without further trouble among them. And these answers would serve to hinder a deeper research into the actual causes of them. Such were the usual apprehensions and

opinions of those to whom the public had been used to listen with most attention in these matters.

Lafosse, many years ago, in France, advanced a fair step beyond such idle opinions as the above, by asserting, after anatomically considering the structure and functions of the foot, that this evil of tenderness proceeded from the elevation of the foot from the ground by the shoe, and the consequent removal of the frog from pressure, which its situation in the foot appeared to him to demand; and in order to remove this difficulty, he strongly urged the use of a thin-heeled shoe.*

Mr. Coleman, the professor of the Veterinary College, has maintained also the same opinion. It would appear, however, that if the cause of the evil had really lain here, his *patent artificial frog*, by bringing the supposed requisite pressure to this part, would have long ago removed the mischief, which it does not appear to do: nor will it be our business at present to consider, supposing this theory to be true, what would be the consequence of bringing strong pressure upon the frog, while the quarters or sides of the foot, confined by the nails, or rendered stiff and unyielding by any other circumstance, should resist the expansion. Suffice it to say, that the conditions premised of the natural foot would be changed; as the foot so treated would be no longer in its natural state; and of course the reasonings made upon that foot as in a state of nature become inconclusive, and the result afforded by the actual experiment gives proof of this. For experience, the severe test and arbiter of the truth of all our reasonings, has shown, that there was some acting cause which stood in the way of the practical use of these doctrines of pressure on the frog; and that, notwithstanding the strong reasons urged in the support of it, neither in France, where it was first propagated, nor in England, did the low-heeled shoe gain ground, or

* La Nouvelle Pratique sur la Ferrure. Paris, 1758, p. 110.

has it been much used; for in so serving the frog, if the pressure was at all considerable, it was sure to bring on a heat of the foot, and on farther exercise in this way, a tenderness that the rider could not but be sensible of; and if pushed still farther, lameness. When we come to consider the structure and real office of the frog, these effects of strong pressure, or of battering upon the ground, will no longer be matter of surprise. And Mr. Coleman has since shod again with a thick-heeled shoe, and afterwards another, provided with an internal clip to rest against the bar of the foot, for which he has also obtained a patent; and these have been followed by two others, also equally well imagined.* We believe we shall be perfectly able to

* Viz., the *Spit-bar* and *Grasshopper* shoes. The former is made with a flat bar of iron from its inner margin, opposite the toe, and passing backwards, is made to lodge upon the frog, and is then nailed on! The other is with a steel spring welded upon the upper surface of the shoe near the heels, intended to rest against the column of inflexion! What a monopoly of patents is here! the ill success and failure of one half of them would have been sufficient to have opened the eyes, and sunk the confidence of any man of less front than our professor; and such grasping too from one whose situation affords him such ample advantages in patronage and emolument.

This last patent having no view to the squeezing of the frog, leads one to apprehend that this miserable and senseless proposition is at last abandoned by him, which we cannot but rejoice at, as it is the second time it has been made the scourge of these worthy, defenceless creatures: for before Lafosse's death, it had again got into disuse from the smiths finding, however specious it was in theory, that it did not do in practice, but without its rejection being attended with any enlightened views or exposition of the cause of its want of success. The revival of it in this country is much to be lamented, as the prejudices of early education are not easily overcome, nor will the effects of it probably be entirely lost in more than twenty years; so widely and industriously has it been diffused and enforced with such a peremptory mandate of acquiescence in the examinations of the *humano* medical committee of examiners for granting diplomas.

I record these shoes also as it were for way-marks or useful points in the history of the art, that they should never again be brought forward to torment the horses or to agitate the profession. This last shoe I shall advert to again when treating of the intortional column of the hoof.

The institution itself is truly noble; and if well conducted, and in good hands, would be a great public benefit.—All I have now to wish is, that the professor should

clear up this difficulty respecting the thin-heeled shoe in our account of the frog, and to show the cause of its failure; and also why horses in general (as daily practice confirms) go so much better in shoes with thick heels, or at least, which is better, with a level shoe, or in a shoe with calkins; for the gradually thickening heel I do not for strong reasons approve.

Much is often said among the amateurs about this and that principle of shoeing. It does not appear, however, that any slight alteration in the configuration of the iron or the surfaces of the shoe deserves that title; the discretion in applying and fitting it admits also of infinite variety of gradations, and these have been often mistakenly termed principles also; and, as though there were two kinds of shoeing, we hear of *good* and *bad* shoeing, without these terms having met with any settled meaning or definition.

It is the principle of all the shoeing at present known, to attach the iron for the defence of the foot to it by means of nails driven somewhat diagonally through the lower portions of the hoof,—the manner of figuring the iron, of disposing the nails, of driving them at different distances from the coffin bone, or the manner and degree

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not quit his situation, but begin a total change of measures respecting the foot, suited to the novel discoveries that have been actually made and in this country; he may yet have time to do a great deal of good if he sincerely and honestly takes it in hand, and also to open the councils of the college as wide as any can desire,—for what secrets can there be in a horse-college if rightly conducted? And to let veterinary surgeons be the examiners of candidates for the profession, which it is but quite natural and proper they should be, and let them be numerous, and the examination public, that there be no favour or collusion. We might then expect to see a good sound horse-school, and veterinarians worthy of public confidence, and not six, and even three months pupils receiving the sanction of the college as fully qualified veterinarians, which we know to have been the case, fairly inundating the country with them for the paltry consideration of the fee. And let whoever will become subscribers to it; for the reader will be astonished to learn that a veterinarian, even of his own making, cannot become a subscriber to it from a law made in the hole and corner committee: the cause of such exclusion may be easily guessed,—it excludes the only persons who understand and feel its abuses.—Abolishing also the sale of cheap drugs.

of paring away the foot, are all discretional circumstances only, though they materially affect the feet and manner of going of the horse, yet are not properly difference of principle, but are acted upon in endless variety, according to the fancy of the workman, and often with more mischievous consequences than the principle itself necessarily entails; and to separate what is owing to the one, and what to the other, is truly difficult where both are injurious.

I had thoughts of separately considering each of these conditions, and laying down more precise rules for them, that the workmen might have some more regular guide for their labours; but discovering a flagrant and unexpected defect in the nature of the principle itself, I have devoted my first labours to the making that demonstrative and clear.

It is matter of great surprise to me now, that so obvious a circumstance could even for a day have escaped my notice; but so strong are the prejudices of education and habit, and the perplexity arising from the usual phrases of the workmen about these things, with a certain fear of forming opinions on what appeared to be so mysterious a subject, that years passed with it daily before me without my perceiving this now obvious fact. Mr. Moorcroft, I observe, in one part of his publication, has stated that the foot from a round is reduced to an oval by shoeing; but here he leaves the subject without a comment, and falls afterwards into the commonly entertained views of these things: and Osmer, many years back, had obscure ideas of the effects of the compression of the feet from shoeing; yet neither one passage or the other in these writers had struck me on perusal, till the facts I am about to expose fully opened them to my view; though now it is clear they had both alluded to this circumstance; yet, from the general tenor of their works, they seemed only to apprehend these consequences from shoeing in particular cases, and understood not what it was that did it.

My suspicions once awakened, could not rest long without their truth or falsehood being proved; and, whilst contemplating the cir-

cumstances with considerable anxiety of mind, an experiment for ascertaining it suggested itself,—that of taking casts in plaster from any sound, healthy foot, under the influence of the shoeing process, and repeating those casts from one period to another, and comparing them with each other; they would then afford me the particulars of change that might take place, and the quantum of diminution of the foot in a given time. Other circumstances unfolded themselves, that were not looked for, as the experiment proceeded, of which we shall now present the reader with the details, so as fully to establish the important fact of the mischievous effects of iron and nails, or of common shoeing rather, upon the horse's foot. The broaching an opinion so at variance with common apprehension and prejudice, would, I well knew, without the clearest evidence, only serve to draw upon me the ridicule of the world, that I was well pleased when I found the thing could be made demonstrable; for how little the fact I am about to disclose was really felt or suspected before by the writers on these subjects, the very numerous works of my contemporaries will sufficiently show. And I may observe, it was during a painful research in making shoes to be put on without nails that I first began to perceive it; and what is extraordinary, the general principle on which hinged the phenomenon still remained unknown to me for more than a twelvemonth after discovering the true cause of contraction.

Any one would very naturally infer that, if I was employed in making shoes to avoid the nails, it was because I saw the ill effects of the nails upon the foot,—no such thing: I had at this period no distinct apprehension of it; and it was to avoid the use of shoeing-smiths and their mal-practices, and in order that every man might be, or by his servant at least, his own shoer,—so near may we be to a thing, and not perceive it.* And when the thought first came over

* The great difficulty of entertaining a new principle will not appear surprising if we reflect that for two thousand years the simple fact of fluids rising to their level, though

me that it was the resistance of the nails that caused all this mischief, it was accompanied with an involuntary suffusion of countenance that I shall never forget, from feeling that I saw, probably for the first time, what had never been seen before, in the same sense of view at least; and the feeling was immediately accompanied with a happy assurance that the evil was then truly seen, and that it would be ultimately removed. But what opposition have I met with, and from whom! That I might expect no mercy from the smiths, whose affairs I had exposed, was quite natural; but that the veterinarians, whose cause I had laboured and gained, should be made by interested knavery my greatest persecutors, was not to be believed. I trusted that if they were attempted to be deceived, they would, as I should have done, have looked and examined for themselves; not trusting to those whose momentary interest, perhaps, it might be to betray: but in this I was also disappointed; for they condemned me unheard, and without examination. They thought they had their accounts from one who had read, and that was enough; that he would mislead them they could not suppose; and to misrepresent and slight me was the order of the day, which for twenty years I have borne in silence.

I now proceed to the details of an experiment that, in the importance of its results, and efficacy of its demonstrations, I may safely assert is second to none that ever was made on the subject of horses —exhibiting a cause of animal suffering which is beyond the utterance of language to express; and what is more, showing in what a simple way it may readily be removed, and has been removed in thousands of cases already, as the testimonies given to the public

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presenting daily to the eye of every one, was not understood upon principle so as to be acted upon for this long period; the immense labours of the ancient aquaducts sufficiently prove the fact; and the daily periodical works and magazines, which treat of these affairs of horses, will show the difficulty that many have to comprehend it now that its cause is demonstrably shown, and the evasive nonsense they use as though to avoid the seeing it.

along with the description of the new mode of shoeing most fully and unanswerably testify.*

It has been an iron age indeed with them, and not in a metaphorical, but literal sense. And I should not have insisted so much on the importance of what I have done, as may be seen in my first edition, where these things are narrated in the most unassuming manner, and my discoveries hardly claimed as such, if they had not been so basely attempted to be depreciated.

Commencement of the Experiment.

A young blood mare of great beauty, and turned of five years old, was brought to my shoeing forge in Giltspur-street from Weymouth Mews to be shod, that had been bred by George Hobson, Esq., and permitted to run wild and unshod till her fifth year, that her strength and growth should be as much as possible completed before she was brought into use. The opportunity so extraordinarily afforded me of making the experiment was not to be lost; for a second, I thought, might not occur; and such another has in reality never occurred to this day.—Timid, and unused to have her feet meddled with, to get an impression was attended with some difficulty: the plaster of Paris was poured upon her foot held sole upwards; but before it could well set, she grew uneasy at the position, and, dashing her foot to the ground, broke it in a thousand pieces; and a second also in the same way. After this, as might be expected, she grew more impatient at being handled, and I almost despaired of succeeding. Being surrounded by many persons, I hoped to effect it better if she was led alone to the stable; and giving her a feed of corn, in order to take off her attention, I placed the foot, unperceived by her, in a bowl containing plaster wetted with warm water, that it might set the

* Description of the new Tablet Shoe of Expansion; with numerous testimonials. Second Edition, 1827.

more quickly. After waiting a few minutes, and the plaster had become perfectly hard, I drew it away without much difficulty, which exhibited a complete impression of her foot in all its circumstances. This was done in the presence of my worthy and much-esteemed friend, Mr. John Biddle of Birmingham, on the fourth day of June, 1804, who felt kindly interested in the successful issue of the attempt, and in the nature of this inquiry.

After smearing this impression or mould with a little lard to prevent adhesion, some fresh plaster was cast upon it: I thus obtained the figure of the foot represented in *Plate* I.; and for the beauty and symmetry of its parts, nature perhaps does seldom surpass it.

That the reader who is not much used to the study of horses may make himself acquainted with the parts of the horse's foot, we shall here describe them in a general manner. They are given for this purpose as large as in nature, that there might be less possibility of error; for the natural horse's foot has never, I believe, before been very truly represented; and by doing this he will be the more prepared to trace the changes it is doomed to undergo by artificial aid. The representation has been admitted, both by the draftsman and engraver, to be attended with difficulty; and but for the kind assistance of my very worthy and ingenious friend Mr. Sydenham Edwards, it would not have been near so well represented as it is: we may also remark, that a tolerably distant view of it, as laying it on the ground, makes it appear to more advantage than a nearer one.

CHAP. II.—*On the Foot. The animal machine viewed generally—its construction and manner of bearing on the foot. Various provisions in the attachments and position of the limbs and foot to prevent concussion. The division of the parts of the foot and of the hoof. The important principle of* ELASTICITY *laid down and exemplified in various animals. The wall of the Hoof—its general form and particular construction—its inflexions. The discovery of the Frog-band—the outer surface—inner surface. The* KERAPHYLLA *described, and* PODOPHYLLA. *Composition of the Hoof, &c.*

Having secured a cast in plaster of the foot of the mare, I propose to wait twelve months, in order to see any and what changes may have taken place in the foot during this period, exposed to the powerful operation of iron and nails. And now, dismissing for awhile the further consideration of the subject of the experiment, enter into a consideration of the construction of the organ that has been thus treated.

I may in this place just observe, that in my first entering on this work, I had only in view to make known the true cause of tenderness in horses' fore feet by the experiment we have begun to describe, and had no view to any anatomical investigation; but being led to look at the foot more closely as an elastic organ, to explain the phenomena of the experiment, its structure became manifest, and formed in the first edition a very long parenthetical insertion in the midst of the experiment, and which arrangement, to remove the dryness and formality of mere anatomical description, I have here pursued also in this edition; concentrating the matter, however, and giving it more of order and method, and adding what appeared necessary; and it is singular that it was not till I had gone far in that work that I fully perceived that it was to the principle of elasticity that all the pheno-

mena were attributable, and that they could be solved upon, and that it pervaded all feet as a fundamental principle.

In the former edition, (1809,) some remarks on the absurdity of the term *heels*, when applied to the horse's foot, were inserted at this part of the work, and which led into a view of the appearances of the fœtal foot of the horse: both these considerations we now defer to a future opportunity; since the fœtal foot cannot be very well understood by the reader till the horse's foot has been treated of; as many of its parts are new and hitherto undescribed, and are as yet without names: we therefore proceed without farther preamble to a consideration of the adult horse's foot; and this description, we trust, will be found widely different from any description that has ever hitherto been attempted on this subject. And in order to entertain as comprehensive a knowledge of this organ as we can obtain, we first take a survey, in a very cursory manner, of the machine which it is destined to support and to carry; and we may then remark how this weight is brought and disposed to bear upon it, and what are the provisions which exist to prevent any injury to the foot, or of any concussion or reaction to the body.

The body, or the trunk of the horse, appears to be fashioned not much unlike a boat, and is formed of rounded, swelling ribs, as in that machine; the sternum has also very much the appearance of the keel of a vessel, and resembles this part in a remarkable manner anteriorly. Now these ribs as they approach above, are closed by the spine, forming a sort of deck or roofing to the vessel, and which is greatly strengthened every where by various eminences and processes of bone rising high above, and projecting strongly on the sides of this ridge or mid-stay of the deck, if we may be allowed the expression; and which is then carried out beyond the boat in both directions, forming anteriorly the neck to which is appended the head, and at the other or opposite end, widening first at the sacrum, it terminates more simply by the caudal extremity, or tail, which, however, is made of considerable length, and is in the living animal most mag-

nificently furnished with hair, so that it becomes no mean counterpoise, at least in appearance, to the larger head of the opposite extremity, and thus eminently contributes to the beauty, grace, and symmetrical appearance of the animal.

Being filled with the various viscera for its life, maintenance, and direction, it is necessary that this boat should now be suspended in the air, and receive the means of its being supported and conveyed about, for which purpose the limbs are provided, placed in pairs, or double columns at either extremity of the machine.*

The two fore columns or limbs, we may observe, are vastly enlarged at their upper parts, and their surface extended, as we see with the shoulder-blades and arms, in order to their firm attachment to the ribs, and the trunk or boat is then suspended or slung between them, resting upon them by various points of attachment, of a soft and lax nature of tendon and muscle; and these fore limbs, we may remark, having to sustain a much greater share of the weight than the hind limbs, receive a perpendicular direction also, thus affording to them the greatest strength of a column: these limbs, however, do not reach the ground in following this perpendicular direction, as that would have given too great a shock; but on arriving near the ground they take a new course or direction anteriorly, and by a succession of three distinct bones, the pastern, the coronet, and the coffin bone, and their respective joints not only divert the line of bearing and direction, but soften the impression to all the parts above and below, as also more remarkably by the extensive spring this angle affords. And the last of these three bones is yet farther most eminently provided with the means of defending itself from abrupt collision or sudden shock by the capacious covering of the hoof and its spring; which at the same time also very much serves to enlarge

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* For a more full account of this admirable arrangement, see a description of the section of the horse: with a superb coloured figure, price £2. 2*s.*; and without this, 10*s.* 6*d.*

the quantity of bearing surface of the foot upon the ground, which in these fore feet is much more extensive than in those behind; and their pliancy also, as we have stated, is more considerable.

The hind limbs, placed near to the opposite extremity of the machine, which is very much enlarged and strengthened to receive them, having a less weight to support, have not the perpendicular direction of the fore limbs given them, but are thrown into angles for impelling the body when in quick action, and by their collapse, projection, and subsequent extension, impel the body forward: the point of the limb in this movement appears for this purpose to be carried out forwards anterior to the centre of motion, and like a fixed radius, is brought to act against the ground, and the body is then shot over it by the power of the muscles of the haunch, which are necessarily immensely large, as they are acting to a mechanical disadvantage so very near to the centre of motion. And in order that none of the force or momentum should be lost, these limbs are attached to the trunk, not by soft muscle as in the fore extremities, but by a solid bony connection, having a strong ball and socket joint; and the hind feet to be in conformity with these limbs in office and effect, are made harder, loftier, firmer, and less yielding than the fore feet. Now the whole weight or impression of the animal, it would appear, becomes finally dispersed and lost on three chief points, so as not to be severely felt by either of them, that is, upon the fetlock joint, the deep front of the hoof, and the posterior, and more yielding elastic parts of the foot. And it farther appears probable, that under particular circumstances it may happen according to the will of the animal that either of these points can be made to receive a greater share, and be the bearer of more weight; and in cases of tender feet, the animal giving his weight more to the toe or to the fetlock, and less to the posteriors of the foot, as when these parts have suffered by contraction and absorption, the strain or stress being then greater upon the above parts, their relaxation and

enlargement will earlier take place, and which will explain the cause of these very frequent appearances, and also of their being so often strained there.

From this short sketch of the general machine, we pass now to the foot itself, the chief object of our inquiries; and that the reader may be able fairly to contemplate this organ, we have provided him, and for the first time it was ever very correctly represented, with a real view of this interesting part, the horse's natural foot, (see Plate I.) uncontaminated by art, at five years old, and pretty fully developed; and to prevent error it is given of the full size of life, in a horse of more than fifteen hands. It was executed by Thomas Milton, an engraver of great celebrity, who was, at different periods, three years employed upon it, and often declared it an object of considerable difficulty.

As method and arrangement gives force and clearness to any subject we are about to treat, so I shall divide the whole mass of the foot, as taken from the limb, into three classes of parts, viz., the *Bones*, or central nucleus of the foot; *the attaching parts*, which are disposed between the bones and the hoof; and *the Hoof* itself. This last we now propose to consider, and believe we shall have to unfold many new and unknown traits respecting it. The hoof again I also divide into three parts,—*the Wall*, *the Frog*, and *the Sole*. But before entering into a description of these different parts, we believe it will greatly facilitate our right apprehensions of the subject if we first take into our view and consideration a most indispensable property necessary to the construction of all feet, which, though of an abstract nature, is able, if duly reflected upon, to explain the mistakes and hidden mysteries that have for so many ages involved this art of shoeing, and concealed its wretched effects in almost impenetrable darkness, and which simple property every part of the hoof is

formed in relation, and made subservient to. I here allude to the simple principle of *Elasticity*, or the condition of an elastic yielding of the hoof to every degree of impression of the weight or of exertion of the animal brought upon it.

This inestimable property it is that guarantees the foot from fatigue, preserves it from jar, and the body from re-action and concussion, and all the injuries which a too solid resistance would have occasioned to both, and probably assisting also the animal in his advances by a return to its former figure after distension.

Examples of the general property of Elasticity in feet.

For the clearer developement of this principle, I shall now select among the various families of the quadruped world some striking examples where its existence and beneficial effects may be conspicuously perceived, and afterwards exhibit it in the foot of the horse more fully, where this property for certain reasons is not so obvious, and which has caused it hitherto to have been overlooked, occasioning to this most worthy animal for a long period the grossest injustice, and the infliction of incalculable suffering and misery.

The feet of quadrupeds, we may remark, in their different races, are very differently constructed for meeting the ground, and for supporting their bodies.—Some of these, which are extremely light and active, and which appear to live on trees, almost as the birds, rather than on the ground, as the *Squirrel*, have their feet formed of long digitations or fingers only, with long horny claws and curved, in order to the running up the trunks of trees, sticking into the bark, and which also enable them to hold themselves if there is occasion, and to run along suspended in a surprising manner to the underside of the branches; and some of this agile family may be almost called beasts of the air, for they can fly from tree to tree, and even descend from the tops of the highest trees of the forest to the ground by making a parachute of their lax and very extended skins; and even our own common squirrel will descend in this way through

the air to the ground by the singular measure of a swift rotation of his bushy tail. And the foot, by its length and elasticity, contributes also in these to soften the fall, and render it less felt: and in every animal this part is constructed with a view to the particular soil which he treads, and to the particular mode of life he pursues, but in all it is made elastic; for example:

In *the Camel*, the foot, in order to its being non-resistant, is first divided deeply into two parts, each furnished with a very strong and broad claw: besides this, underneath each hoof is found an elastic pad, into which the hoof sinks, and is embedded all round as in a soft stuffed cushion, and rising up the sides of the foot, keeps off the effects of the hot and scorching sands of those regions, which nature has more especially doomed him to: this extension of surface also must cause him less to sink into them; the whole apparatus affording the highest degree of elasticity and ease the foot is capable of receiving, especially necessary in those hot countries.

In the *Dog*, nature, or a kind providence rather, has placed a large triangular pad in the middle of the foot, covered outside with tough horny skin: and another of a similar description, and smaller, is found at the origin or base of each claw; and these appear to be formed within of tough *fibro* or *tendino* cartilaginous materials, and are covered, as we have said, exteriorly with a hard horny skin. This organization affords an elastic bearing for the animal, and breaks the force of concussion upon the ground in passing rapidly over it. This effect also is contributed to, and much augmented by, a division of the bones of the metatarsus into four parallel ranges, giving to all these parts a remarkable flexibility.

As to the Cat, we may remark, that her foot the moment that it meets the ground, descending from any height, is seen widely to expand, and that the fingers and the claws spread on all sides to widen the surface of bearing and deaden the shock. We observe also mats or cushions in the centre of her foot and at the root of the claws, performing the same office as in the dog; they are, however,

of a softer nature, but fully sufficient for an animal so obviously light, small, and active. A nobler example is the lion's paw.

In the *Ox* there is not properly any mat or cushion to the foot; the claws, however, are thinner on the inside; but in this sort of simple cloven foot, which is common to a very large share of the quadruped world, the elastic principle necessary to these parts is chiefly accomplished by a longitudinal division of the podal and juxta-podal bones of the foot as high up as the fetlock joint; and this division gives to these parts all the suppleness of which there is need, and affords an easy yielding to the impression of the weight, and destroys any jar or repercussion to the body. The two claws also on meeting the ground, if it is soft, will separate, receiving the earth between them, and so will diminish the suddenness of the impression, and also widen the bearing surface and render the foot more fixed and firm on the ground. This flexibility, indeed, in some of these animals exists to such a degree, as in the cows for instance, that the sight of it is almost disgusting, when the weight of their bodies reposes strongly upon it; but we are reconciled to it when we reflect that this same property, though somewhat unsightly, is particularly well adapted to the general structure and uses of these invaluable creatures, and to the innocent and peaceful habits to which a kind providence has ordained them.

The *Elephant* possesses in an eminent degree this elasticity of the foot; his immense body is sustained on four columns, placed almost perpendicularly underneath this ponderous weight. Their bases, or inferior extremities, repose upon a vast mat or pad, made of a material apparently between horn and cartilage: this central mass resembles a strong piece of sole leather or raw pelt, and this foot is exteriorly divided into five parts, each terminated by a very strong horny claw or hoof; one of these, and larger, is placed in front, and the other two are disposed on each side. It is not improbable that these claws, when the animal is in quick movement, will aid him, by taking a share of the weight, and by being forced strongly against

the ground, dig into it, and give perhaps a certain degree of fixedness to his march.

The *Foot of Man*, on pressing against the ground, extends and dilates in a very visible manner in all directions; and as the upper leather of the shoe is much thinner than the sole, so it readily permits this change of form; and also the hollow which is observable beneath the foot, and which we call the *planta*, or sole, and which represents a kind of vault or arch, sinks, and flattens on receiving the weight, and consequently extends, thus preventing any jamming or condensation of the parts together, and so preserves to all of them their natural freedom and liberty.

In respect to *the Horse*, this indispensable property has also an existence in his foot, but in a much inferior degree, and perhaps less so, as I have already observed, than in any other animal. But we shall not be astonished at this, if we reflect that with him is accomplished one of the most difficult problems in mechanics, that is to say, the moving of a large and heavy body with an extraordinary degree of velocity, and for the surmounting this difficulty, a remarkable degree of solidity appears to have been imparted to his foot by a hoof of one piece, in order that nothing of the momentum afforded by the osseous and muscular machinery should be lost. And without doubt this solidity it was of the foot of the horse that has occasioned this elastic property to be so long wholly overlooked, and has led these smiths to treat it more as a senseless block of wood without any motion than as a living elastic organ, most elaborately constructed for these extraordinary performances, and whose construction, these circumstances premised, we now resume the consideration of.

We do not propose, in giving this account of the foot, to enter into a tedious detail of minute circumstances of a common-place nature in the construction of the foot, as such cannot explain the

arts of shoeing, and its difficulties and mysteries, though it might very well serve, as it has done before with some, to make a book for sale; but intend to confine ourselves chiefly to the hoof itself, which will nearly explain all that is necessary. In order to illustrate these subjects, we shall divide the hoof into its constituents of three distinct parts, which has not been attended to before, and view them afterwards connectedly, to show that they produce by their combination not only a box of horn for the covering the foot, as it has been hitherto generally regarded, but also a most beautiful machine, possessing remarkable properties, and an almost indefinite power of yielding to the load, a property as indispensable as the defence and protection that it so obviously affords.* We commence with its chief member.

Of the Wall of the Hoof.

Its name.—General form. All the exterior part of the hoof, which is seen by the eye when the foot is placed upon the ground, we call *the wall of the hoof*, for, like the wall of a building, it sustains all the more delicate parts within, and serves to protect them from the injury of the external elements: the French also call this part for the same reason *la muraille*, or the wall, which we vastly prefer to the miserable term crust, by which some have designated it, and

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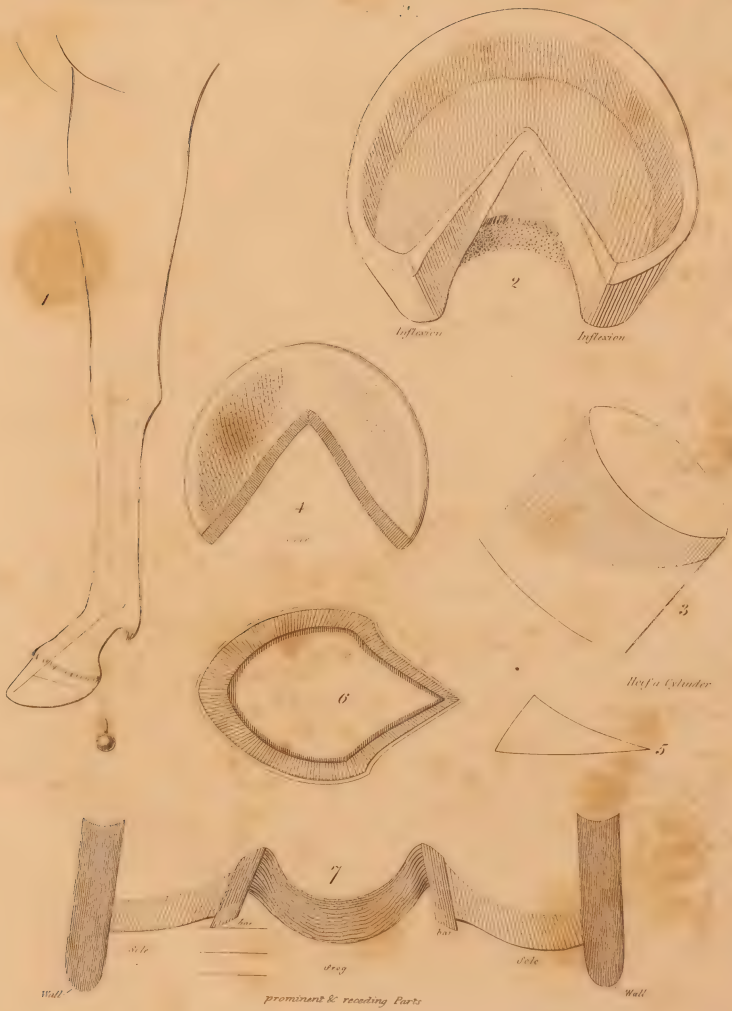
* As this work may for some time be a work of reference in our art, so I take the earliest opportunity of explaining to those who may not have studied the Greek language, the signification of the two words used in the title, the utility of which, as distinctive names will be found at all times in speaking of or referring to this work, as they may be used at full length or in any abbreviation, as Clark's Hipponomy, or simply Clark's Podonomy, instead of a long tedious explanatory title, which in English would have been necessary; for new terms are best to fix new arts. The first of these, *Hippodonomia*, is derived from ἱππος, a horse; πους, ποδος, a foot; and νομος, a law. The other is from πους, ποδος, a foot; and φθορα, *corruption* or *destruction;* from the same root, φθειρω, as our common word *Phthisis* used for the complaint called a consumption. And to those desirous of an abbreviation, *Podora* would supply a term of easy use.

which can afford no idea of its rich organization or properties, but must ever serve to convey a truly mean and baker-like notion of it.

The wall, when separately considered, (see plate **2**, fig. 2,) must be regarded as the basis of the hoof, or its principal member, and the other two parts, viz. the sole and the frog, as subordinates or accessaries only; and by so viewing the hoof, we shall arrive at more just notions respecting it, and comprehend better its real formation.

Now as to the hind feet, they differ materially from the fore feet, though hitherto confounded as the same, which is important to know in respect to shoeing, as they are not so much affected by it; and this circumstance has led many to doubt the truth of these illustrations, contending that as they are the same, the effect should be the same of the iron upon them. Now we have formerly stated that the weight of the animal falls with a different force upon the fore and hind feet, and that the fore are more burthened with it: this is one cause of their being made larger, and with more flatness also and elasticity, that they might yield to the weight or projection; and further also, that they might be in conformity of design with the softer nature of the attachments of these extremities to the trunk. Whilst the hind feet on the contrary are stouter in the wall, and loftier, with the sole in front thicker, flatter, and more strongly attached to the wall, and are less elastic. This is important to be known, as it explains readily why the hind feet do not suffer so much by the shoeing as the fore feet, and which has been made a stumbling-block to many by leading them from seeing the real state of the case. For the smiths urged in defence of their practice, that all the difference in the hind feet not suffering was that they were exposed to the dung of the stable, thereby inferring what was not true, that if the fore feet were similarly exposed they would not suffer, and that it was an affair of the dung only, or chiefly.

But the influence of such a cause, and which does hardly exist where the stables are kept clean, must be truly insignificant compared with the powerful operation of such agents as the iron and



Sydm Edwards Delin

F. Sanders Sculp

nails: but to set this matter at rest, the reader will find further on an experiment related, where the horse was shod for a twelvemonth, and kept at grass the whole time; and the same contraction took place as in the stable, which fully disproves these idle apprehensions.

But to return to the fore feet. The weight of the trunk reposing on the limb, we have seen, is conveyed in a perpendicular direction to the fetlock; there it is diverted by the juxta-podal bones, which convey it to the foot, to the front of the hoof especially, being its strongest and deepest part; from thence again, by the reclination of this part backwards, it is determined in this direction towards the posterior parts of the foot; and these having a double or two-fold termination, with an eminently-elastic part lodged between them, they readily yield to the impression, and soften its effects, (see pl. 2, fig. 1.) And in this way the elastic principle on which we insist is fully established with the horse's foot. And further, this backwards direction of the impression or weight, is vastly increased by the rapid inclination which the two bones of the foot have (viz. the coffin and shuttle bones) by their surfaces for articulation strongly sloping towards these posterior parts of the foot, occasioning the foot not only to dilate, but also to extend backwards.

Of the general figure of the Wall. A superficial view of the hoof has very naturally led to the apprehension that it was of a conical form, and it has been hitherto always so described: we shall however show, and for the first time, (ed. 1, 1809,) that this is wholly incorrect, and that it could have answered no useful purpose if it had been so made. Its figure will be found to be truly that of a cylinder, (see plate 2, fig. 3,) which will be proved by observing that the posterior terminations of it have the same direction or slope as the front parts have, and are parallel to them, which could not have been the case had it been a cone, as in that figure the projection or widening downwards would have been on all sides alike; and the quarters, so far from projecting outwards, will be found by the application of a carpenter's square gage to be nearly or quite parallel to the axis of

the cylinder; and in the most beautifully formed feet, the cylinder is found to be almost perfect, unless the mere weight and excess of growth beyond the sole interrupts it in a small degree.

The great utility of this general figure will be striking, if we consider with how much more power a cylinder embraces its contents than a cone, which enlarging downwards, would not have prevented the contents of the foot from slipping through on any strong exertion of the animal, as the cone is ever presenting a wider area in this direction." The painter or sculptor who is acquainted with this principle, will very readily give its figure correctly; but in uncertainty of its true form, or mistaking it for a cone, he will give a mixed, confused, or erroneous representation of it; but in designing its beautiful outline truly, we shall see hereafter that the frog-band and the bulbs of the frog should not be omitted in its representation, and which parts are also truly ornamental.

But that the hoof is really a cylinder within, may be maintained from the direction of the Keraphylla, which are every where parallel: had this internal surface been conical, they must have diverged, in passing downwards to fill it, which seems to settle the question beyond any cavil.* Besides, if the hoof had been a cone, by continually growing larger downwards, it would have greatly incommoded the animal; whereas a cylinder always remains the same: its growth also would prove it, since how could the circle, once formed at the coronet, receive within it any accessions afterwards, as such would narrow the area of the hoof inside; and that nothing is really added, a perpendicular section of the hoof shows plainly.

Now if we desire to prove this mathematical figure of the hoof, we take a cylinder of wood of about two diameters long, and obliquely

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* That I may render that justice to others I have in vain sought for myself, I may here state, that this observation was lately made by my nephew, Charles Clark, whom I invited over from America to my assistance, and who, I hope, may one day become an ornament to his profession.

saw it asunder in the middle with a fine saw at an angle of about thirty-three or thirty-five degrees to its axis, and place these pieces with their cut side downwards on the table, we shall then have a striking resemblance of two hoofs, that is, in respect to their general figure; (see plate 2, fig. 3;) but if we want to have an idea of its whole composition, we must make a cylinder of paper or pasteboard, of larger dimensions by one half than the hoof to be represented, and truncate or cut such cylinder across its axis obliquely almost to a point, leaving enough only to hold the ends together, by then turning these points from outward inward, towards the centre of the circle, we shall have a lively view of all the main circumstances in the actual construction of the wall; and at plate 2, fig. 5, is seen a representation of a pasteboard cylinder, so cut before the ends are turned in to represent the inflexions, and at figure six one with the ends carried into their place.*

But although it be fundamentally true that the hoof is formed on the principle of the cylinder,—and it is highly important to the veterinarian to understand this,—yet, like most general laws, it is not without exceptions and conditions; for there are at times variations in the lower parts of it, that is, chiefly in the parts below, or at the insertion of the sole, or below the direct box of the hoof, where either the operation of the sole in distending these parts by flattening its arch, or the mere mechanical operation of the weight of the horse causes a bulging in these lower parts, extending thereby its surface, perhaps to obtain room, and may disturb but not at all destroy the general principle; it is, however, found on examination by actual admeasurement, much less than the eye alone would lead one to apprehend, but we have thought it safest to state thus much to anticipate the objectionist.

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* Elegant models of pasteboard, contained in a handsome box, with a description, &c., may be had of E. Limebeer, Giltspur-st., or G. Underwood, Fleet-st., price 12*s.*

The wall of the horse's hoof, we may remark, is highest at the toe, pince,* or front parts, and regularly declines in height as it passes backwards, forming the quarters; and at a certain point, still more posteriorly, it has the appearance of being lost in mixing with the frog and sole, as it will be generally seen represented in books and in plates of the foot; but in reality it makes at this point a sudden and unexpected turn inwards, forming an acute angle, with a sharp projecting edge backwards, and then continues its course, still diminishing in height, to the centre of the foot, where it seems finally to be lost in mixing with the sole; and thus simply is formed the shell or external frame of the horse's hoof: see its plan, plate 2, fig. 2.

It is also to be further remarked, that as the hoof is thickest and most solid at its front parts, or pince, so it becomes regularly thinner as it declines in height and recedes backwards, and so through its whole course to its termination at the centre of the foot; and former writers have considered the bars or inflexions as somehow parts of the sole rather than of the wall, and had no distinct notion of the great simplicity and power of such an arrangement acting in one piece, and which cannot but call forth our exalted admiration of its supreme Architect.

These parts thus inflected are made to form a distinct and remarkable internal wall, as it were, for the interior of the foot, within the very cleft of the sole; and by their bold projection, protect the sole and frog from an undue degree of pressure and contusion against the ground.

These inflexions have been called the *bars* of the foot, as though to convey an idea that they kept the wall from going inwards, or contracting in its dimensions; but it is doubtful if they can really

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* This useful French word I could wish to see adopted in English, in order to avoid the awkward word *Toe*, which but ill expresses the thing intended. It is probably derived from the Latin, *impingo*, to impinge upon or invade.

perform such office, but seem to obey rather, and pass in with it if it contracts, as we actually see take place in contracted feet. They have a deflected appearance, or are inclining downwards and outwards, that any pressure against them from the ground may drive them to dilate or open outwardly and from the frog, and thus follow the general dilatation of the wall and quarters, and prevent any painful jamming or condensation of these tender parts. Their characteristic appearance is very well given in the frontispiece, or plate I. Opposite the middle of the frog they form a more spacious concavity, and then suddenly close in approaching the point, especially on the inside quarter, and near their termination, they become flakey and are less coherent. Along their upper edges the frog is attached, and their actual union with it we call *The Commissure*, after the manner of the ancients. The hollow spaces formed by the lateral recedence of these inflexions, we call the *Cavities of the commissure*. And in order to speak of, or consider them more easily in their qualities, or adjectively, we call them *Intortiones*, or *intortional* or *inflexural parts*, the convenience and advantage of which will be often perceived in the course of this work.

We may now remark that the sudden inflexion of the wall gives it as it were a duplication, or doubling of the horn at these places; and two stout columns of horn are thereby formed at these points, of the greatest utility in the natural, and still more so in the artificial defence of the hoof, for the iron to rest upon, without the danger of its injuring the sole, or crushing or confining its extreme point, which is but too often bruised by the shoe; and its lacerated vessels giving out red blood, it is artfully termed *a corn*, though human corns are not usually red, but are white, hardened, and extended cuticle, from a morbid action induced by pressure and friction, and have no sort of relationship to these bruises.—Now in the natural hoof, these columns of the inflexions form below a hard rounded knot, abundantly useful in defending from wear these pos-

terior parts, and from bruises the tender point of the sole below them.*

And it is with painful feelings I am here led to observe, that in my visit of eleven months to Paris last year, (1828,) where I was much engaged in noticing their shoeing, I found that the horses generally, especially those shod by veterinarians, were shod with a narrow, thin-heeled shoe, which did not extend in a general way to these points or columns. And as I understood by the recommendation of the veterinary college of Alfort! indeed, on turning to Prof. Girard's book, second edition, Paris, 1828, "*Traite du pied des animaux domestiques,*" he plainly recommends such a shoe: p. 58, 60, 68. I need hardly add these poor horses were going most miserably crippling and bad; and were strapt up and most unmercifully gagged by that atrocious instrument of torture, the bearing rein, which is but too often applied in a cruel manner to punish their unoffending jaws, and to keep them from remembring their feet.†

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* Coleman's Grasshopper Shoe is intended probably to ease these parts in low weak feet, which there would be but little occasion for, if the smiths would be more merciful with their knives, and accommodate the shoe to them by a slight deflexion of its plane at the extremity of the branches; and some are readily relieved by throwing them more on the pince by calkins, but not all. This spring is unmechanical, and liable to choke with dirt.

† What views the generality of these veterinarians might have in thus shortening the shoe is truly hard to guess; but from one of the most intelligent with whom I conversed,—indeed he so stated,—that his main object was to prevent corns. I soon perceived whence originated their fears in this respect, and that it arose from their operators, who, not satisfied with the mischief that in a few minutes a sharp buttress was capable of doing, resorted to the use of a long piece of a sword-blade, and this driven with a hammer, soon removed deep portions of the inflexural columns; and these protecting points being removed on the inside and outside alike, the risk of corns would certainly be very great, the sole being then exposed to the full effects of the iron. And to avoid this, the shoe forsooth must be kept short of reaching these points! instead of altering their vile custom of not performing this delabrement. So that we see plainly in spite of veterinary colleges, which I hesitate not to say have done more harm at present than good, how wretchedly these poor animals are treated, and how from one

Though somewhat ambiguously, Professor Girard espouses the doctrines of La Fosse, see p. 66, and seems to think this narrow Paris shoe the point of perfection,—the length of it is directed to be between that of Lafosse and Bourgelat, which is about the length these miserable shoes are actually made: his words are, p. 68, "Beaucoup plus long que celui de Lafosse et plus court que celui de Bourgelat, il est legerement couvert," &c. So that the Pancras professor, and the Alfort professor, seem very much to have fallen into the same pit, which Lafosse, who detested these colleges himself from the base conduct of their professors towards him, most unintentionally dug for them. When I was on the Continent twenty years ago, their horses were shod with a thick and rather clumsy shoe, extending full to the inflexions, and is the shoe I have described and figured in my works as the *French shoe*, and certainly as good as any not having motion. These horses were then going much better, and those shoes often had the advantage of cover and of calkins, which seem to be denied them for the fore feet by this writer.—If this exposure should procure them any relief, my purpose will be answered in this rather

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abuse these men are led into the commission of a greater. And yet under all disadvantages, these poor abused and wretched creatures are expected to perform their full labour, which in this country (France) is often revoltingly cruel from its disproportion to the weight and strength of the animal, more so, I have thought, than in England, where also is wanted much reform in this respect. For extreme heavy loads are worse if possible than severe beating and scourging, which all admit to be wrong, and ought to feel it a duty to interfere about, when they see such enormities practised, and repress them; and this ungenerous infliction is made also upon one of the most willing and unoffending of animals. Surely we are not justified in taking these animals from their natural haunts to serve us, and then in return to ill-treat them, nay, to inflict upon them punishments of the most cruel description. And it appears an anomaly that is unaccountable, that if a man should tie a horse to a post, and give him a hundred lashes every day as severe as he could contrive to make them, every one who saw it would no doubt be revolted at it; but let him only first put him into some clumsy lumbering machine with four wheels to it, and he might then proceed to give him double the number, and nobody would regard it, though the unconscionable burthen was added to the infliction.

long digression. For an account of the advantages of cover, (or wide bearing surface rather,) he may consult my work on the *New Tablet Shoe*, which he seems not much acquainted with, (2 Ed. 1827,) and he will there find proof enough of their utility: but why not try them instead of pretending "he does not know their effects."

As the above knots or points of the inflexural columns are of great consideration in shoeing, we propose for distinction, and speaking of them at once and without circumlocution, to call them, *The Nodes of Inflexion*, or *inflexural nodes*, by which they are brought under notice without any tedious explanation of what part we mean, as would be the case if we called them heels.

We now are led to survey with more close attention the natural foot, given in plate I, and we shall readily see that the outside quarter referred to by the letter *c*, is more bulging, or describing a wider circuit exteriorly than the inner quarter is observed to do, which is, however, more conspicuous in the lower parts of the hoof than the upper, and destroys in a small degree the cylindrical figure which as a general law it obeys, so difficult is it to confine nature by rule, who sports without controul for her own advantage.

At first I was led to apprehend that the cylinder of the hoof was in a slight degree twisted on its axis to produce this aberration of figure, but thought afterwards it was better expressed by saying that the bone and contents of the hoof were pressed away, as it were, from the outside, occasioning a greater fulness to the inside quarter of the foot; and there appears in many feet, though we rarely get them till they have undergone more or less change from shoeing, which reduces the sides to the same figure, a slight difference in the two sides of the coffin bone, which would not fail to communicate its impressions to the whole foot. But in order to consider all the beauty and purposes of this singular construction, we must dismiss from our views the miserable, coerced, shod foot entirely, and consider the animal in a pure state of nature using his foot without

any defence, and we shall then see what difficulties he would be exposed to, which these provisions would diminish or remove.

The enlargement of the outer quarter of the hoof appears to be attended with many advantages; it first serves to give more extent to the general bearing of the foot on the ground, and by this increase of bearing to render it more secure and firm; and secondly, the weight distributed over more points of bearing will be less felt, and is made easier to the animal without incurring the risk of cutting the opposite leg, as would have been the case if such enlargement had taken place on the opposite side, or if both sides of the foot had been made equally spreading. The horn of this outer quarter is also something stouter than that of the inner, which, together with its greater extent, enables the workman usually to place a nail more in this quarter in fixing on the shoe than in the opposite one. And in the wear of this quarter, (in the natural use of the foot for example,) it being the wearing side, should it be severe or carried to excess,—and horses in a state of nature, and for the first thousand years after they were called into the service of mankind, were used entirely without shoes, as we have distinctly proved,*—so it will be obvious that the attrition would not so soon reach the bone or quick as it would have done if the bone had been brought to the edge of the hoof on this side, nor would any scraping abrasion or friction, or any rude impression when the hoof grew thin, be so injurious or so much felt. And it will be also equally obvious that the augmented line of surface of the hoof for wear will by this enlargement cause the detrition to proceed much more slowly.

The *internal* quarter, or side of the hoof, we see is more *fine*, as it is called, that is, straighter and less bulging than the outer, the advantages of which are obvious in respect to cutting the other leg; and this side also is a little thinner in its horn, and extends farther

* See dissertation on the knowledge of shoeing of the ancients, which will be reprinted at the end of this volume.

backwards, and is sharper; it is also more upright, and is fuller or deeper downwards than the opposite quarter; so that if we went on paring away equal slices of horn from each side of the sole to an horizontal level of the eye, we should sooner arrive at the blood on this inside than on the other.

More than one useful purpose appears to attend this formation of the foot. The greater elevation of this inside quarter appears to give a slight degree of mechanical advantage to this side by throwing off the weight to the opposite more extensive and stronger side of the hoof, and confers perhaps a degree of ease in the standing as well as going of the animal, which is farther contributed to by its being more yielding and elastic; and it is also, we may remark, by this provision relieved from the oppression which its proximity to the line of gravity of the trunk falling between the legs would occasion it. It may also, when the animal is in action, be usefully felt from this quarter exposing a broader, more elastic surface for the bone to act against in the sustaining as well as in the first efforts of projecting the body, as in rising for a leap, &c. We see in the plate how much sharper and more prominent the intortional node is on this inside; which must protect the sole, and by its sinking into the soil, tend to fix the foot more solidly, and will render the impression also less felt. This inside quarter requires the greatest care and attention of the shoeing-smith, who ought to be made to learn its structure and habitudes well before he is permitted to undertake the covering of it with his iron. And in examining their qualifications, this should be made a point of particular inquiry and solicitude: for their ignorance of this it is which causes them to lay their iron upon and bruise this tender point. And the provisions of nature to obviate the bruising of these tender parts are worthy attention. The coffin bone on this account is at its very extremity a little relieved or elevated by a shaving of its thickness being removed from its under side; and by this means any violent pressure upon this point is avoided by its receding from the general level of the underside of the bone.

These processes or extremities of the coffin bone scarcely exist in the young horse, but extend backwards with the growth of the hoof and the full developement of these parts.

To prevent any direct pressure on these tenderer parts of the foot, the smiths usually bevil or slope the upper surface of the shoe downwards and inwards, and which has been much inveighed against by various writers on these subjects, and considered as the principal cause of contracted feet, though those who thus complained, and reasoned without the practice, did not know that horses if shod differently would not go so well; for seated shoes level in this part do not, as practice and experience confirm, so well suit the foot as those made with a slight bevil or inclination in every part of their upper surface, which also prevents the horn from cracking up and splitting better than a flat, seated shoe; and as to the contraction of the heels, we shall see presently that it arises from quite other causes. That unless carried to a great excess indeed, this bevilling does not appear to make so much difference as might be imagined, and this on account of the firmness with which the foot is held upon the surface of the shoe by the nails, which fix it almost immoveably as to its going either in or out; and this fixedness is farther aided by the inequalities of the iron to which the horn adapts itself; for it must be obvious that the inflexural parts of the hoof can have no great extent of motion but in concert with the quarters, and which are, by the nails passing through them, most immoveably fixed.

Now the pince of the inside quarter is seen to be vastly more projecting than the pince of the outside quarter; which is not only so naturally, but is rendered more conspicuously so from the other side being worn away by the natural wear and action of the horse. This prominent part has received a name with the French, who call it *La mammelle*, or *The teat*, but with us it is without name.

We may next remark of the two inferior nodes of the inflexural columns, that on the outside is more *evaseè*, to use a French expression, or extensively thrown out, and tortuous, while that of the inside

is deeper, or fuller, and rather thinner, and consequently more elastic in its horn, and rises higher in protecting the point of the sole, and is not so much rubbed away in the natural use of the foot.

Of the wear of the hoof. We may perhaps introduce at this place our remarks on the wear or detrition of the hoof in the natural use of the foot, but which is wholly done away by the defence of the shoe, and which must also operate its peculiar effects upon the foot in diminishing the natural elasticity and liberty of its parts, which such defrication or removal would occasion them to have. That part of the hoof which is rubbed away on the foot meeting the ground and on leaving it, we call the line of wear; it extends in this foot, as we may see in this elegant plate, from the inside pince to the letter *c*, very far along the outside quarter, leaving the inside quarter almost full, entire, and free from wear, and is not in front of the foot, or across the extremity of the toe or pince, as might be naturally expected.

We have thought that the sole along this line of wear is thicker harder and more intimately united to the wall than elsewhere, especially in the natural foot, often communicating a smoothness, hardness, and polish to these parts, that the natural soil can make but little impression upon, and which in grass fields, and especially in snows and ice, acquires an almost flinty hardness of surface, and many, very many horses, belonging to gentlemen not using them more than for their own healthful exercise, might go perfectly well entirely without shoes, and so escape all the frightful catalogue of evils that at present belong to this art.*

* On smooth flat stones, like the flag stones of the streets of London, a horse would probably travel some hundred miles before his hoofs (which would be hardened and polished by them) would be worn through; and of this description were the Roman causeways, on which the rattling made by the hoofs very naturally suggested their favourite epithet for the horse of, *Sonipes.*—On an English gravel road I have found by experiment, with a natural foot at five years old, that thirty, or five and thirty miles, is as much as they will do, though by taking all advantages of grass which grew by the road side, of deep sand in places, and by great care, I once rode from London to Calne in Wiltshire in less than three days, on my way to Bath, without shoes.

This oblique direction in the wear answers a double purpose of the most useful kind; for a bare mention of the facts would have hardly any interest if we did not venture to explain the causes of them also.

In the first place, the attrition and wearing away of the hoof does not proceed so rapidly as it would have done had it gone on in a straight line across the front of the toe from the foot being narrower there, and œconomy in this respect is of no small value to the animal in a state of nature, or used without shoes, as was formerly the case everywhere, and is still the case in some countries, the wear is thus turned towards the strongest and hardest part of the hoof; and the remarkable bulge, noticeable with this side or quarter of the hoof, extends the line of wearing surface in a still greater degree; which, with the projection of the mammelle, will also augment this line, and further aid in preventing a too rapid detrition of the hoof.

And we may farther remark, that this mode of wear of the hoof is not directed to the outside of the foot by any mechanism in the foot itself, but by the bones of the knee having their surfaces for motion directed outwards, so that when the foot is off the ground, or put in motion, it is obliged to follow this direction: cutting, or interfering with the opposite leg, is at the same time also materially prevented by this beautiful arrangement.

Of the natural bearings of the foot on the ground. It is a circumstance not devoid of interest, in respect to the foot and shoeing, and hitherto unnoticed, that the surface of bearing of the natural hoof is not, as might be expected, round the whole line of the inferior circumference of the wall; but that the horn of the inside intortional column is, as we have frequently before remarked, on a lower level than the outer inflexion, thereby taking a first impression, and inclining the foot to the opposite side. Next to this, the bearing extends along the quarter to the mammelle, and thirdly, the outer intortional column, take their bearings, thus sustaining the weight, as it were, upon three distant points, acquiring thereby the greatest firmness,

with an extraordinary share of liberty, more so than it could have received, had it borne equally all round the circumference of the hoof.

We may also remark, that this inside quarter being brought nearer to the centre of gravity of this extremity of the body, which would probably fall in a perpendicular line between the two fore legs, would perhaps, if not thus elevated, have an undue share of the weight, and also a less power of resisting it, which, by the elevation of this inside of the hoof, is directed more to the opposite side, or is brought by this means to an equipoise of bearing with the other side, and the pressure also by this obliquity is thrown outwards towards the wider and stronger parts of the foot; and this provision also beautifully tends to separate the two feet; for if the same inclination had been inwards, the approach of the feet to each other would have been the obvious consequence, and would have narrowed the base with certain inconvenience. The inner and posterior more elastic parts of the foot are also more at liberty for the exertion of their elastic properties by the diagonal point of these parts in the wearing line of the foot being wholly removed from the ground, and thus will contribute still farther to the freedom and liberty of every part of the hoof.

However perfect the shoeing art may at length become, we can hardly expect that it will reach half the perfection of these arrangements in the natural bearings of the foot, and at present they are wholly sacrificed.

Of the external surface of the Hoof. Having traced its general form, and the manner of its using, we now propose to consider its two surfaces. The exterior surface of the wall of the hoof is everywhere covered with a shining polished coat of *cuticle* or *epidermis*, which ought on no account to be removed, since it is its best defence against the elements without, such as the drying effects of the air, and the rotting and impoverishing effects of soil and dirt. But which coat the more ignorant class of smiths generally remove with mischievous activity with their rasps, under the mistaken notion of

cleaning the hoofs, which need only to be washed with water to be perfectly so; and their taste, I am sorry to say, is no better than to admire this unnatural, denuded offspring of their ill-bestowed labour. And regard it not, though daily seeing its injurious effects, loving rather to have their own way in so obvious an error than to allow themselves in any manner to be instructed.

The external coat removed, the hoof afterwards, especially in dry weather, often cracks, and these cracks extending, at length reach the quick, and dirt and sand getting in, excessive lameness is the consequence, and they are then said to have *sand* cracks, as though the sand, which only casually occupies the crack, occasioned it. The hoof also drying generally after this proceeding, becomes excessively rotten and brittle, and the nails then easily split it up with terrible consequences, often making a closer nailing necessary than is prudent, and the flesh becoming compressed, pain and lameness ensue, and render the horse almost useless, and often lead to his being prematurely destroyed. The whole hoof also, after such a proceeding, is subject to become dry, hard, contracted, and painful to the animal, all these should induce us to forbid it with the greatest solicitude.

Of the internal surface. The internal surface of the hoof, instead of being smooth like the external, is furnished with a magnificent apparatus of perpendicular leaves, or processes of horn, for the more secure attachment of the foot to the hoof.

These plates when recently exposed are soft and elastic, but soon dry in the air, and then form a substance very analogous to, if not truly, horn: see pl. 2, fig. 2. These processes, we may observe, in a surprising manner serve to multiply and increase the internal surface of the hoof, and they receive between them other plates of a similar figure which arise from the bones of the foot, and by their intersusception and locking with each other, afford a suture or bond of union of the strongest kind, and being elastic, they permit also the divers movements which the bones of the foot demand in the hoof, without the risk of laceration or disunion.

As to the number of these processes or leaves, by counting them on one half of the hoof, I found them about two hundred and fifty; consequently the number of the whole hoof is about five hundred. If we examine them more attentively, their loose or floating edges appear to be thinner than their base, or edges of insertion, and they are often seen torn and ragged by the separation. I also thought that whilst those of the hoof partook more of the nature of horn, those of the foot seemed more of the nature of cartilage; and as these latter are said to be sometimes ossified, it would seem to prove that they are so, since cartilage is often, but horn never, converted into bone.

If we remove them from the hoof, and examine them with the microscope, we discover two plans of fibres, the one in parallel lines to the axis of the hoof, and the other obliquely intersecting these; and if we draw them with the fingers in a perpendicular direction, they appear not to yield much, if any, but drawn transversely, or in an oblique direction downwards and backwards in the direction of the posterior parts of the foot, they extend and are elastic, favouring the natural movements of the internal foot in this direction.

I have stated already that the weight of the animal was projected more forcibly on the front of the hoof, and we see that the longest and most powerful consequently, of these processes, are there situated; and we may farther observe, that they are placed obliquely, ascending over the bone of the foot, which is held, as it were, suspended by them as to an elastic frame, and from which circumstance it is evident that the lower parts of the hoof should not be too much thinned and weakened, as they sometimes are by the sole and quarters being thinned desperately, by which is endangered the separation or straining of these tenderer parts, inducing often deformity of the hoof, and sometimes founder, and they appear quite ignorant of the consequences of such a proceeding.

By this beautiful mechanism it is, together with the distribution of the different parts of the hoof, that this animal obtains that lightness

of carriage and gracefulness, and springiness of action, for which he is so deservedly admired, and which has no existence in the weightier quadrupeds that walk on pads.

One should be desirous to know the real quantity of increase of surface which such an extraordinary apparatus would afford; and my late excellent friend, Thomas Evans, LL.D., mathematical teacher of Christ's Hospital, worked this problem for me with, I believe, extraordinary scientific precision and accuracy; and without going into all the particulars, for it requires circumspection, it appeared to afford an increase of actual surface more than the simple internal superficies or area of the hoof would give of about twelve times, or about 212 square inches, in a horse whose height was about fifteen hands, or one square foot sixty-eight square inches, or nearly one square foot and a half; and this calculation was made upon a horse that had never been shod, in which these processes were found to be transversely deeper and more free from colour.

And it is evident that these plates or processes of horn, independently of their augmentation of the surface, will produce also a still farther strength of union by the adhesion they have to one another, as is the case with all well-fitted and well-applied surfaces, a sort of attractive force that holds them together, and renders any motion upon each other, or separation, very difficult.—The processes proceeding from the hoof are generally stiff enough to maintain their figure, but those of the foot are more limber and flaccid after recent separation, and fall together.

The union of these processes must produce a suture of most remarkable strength, and from their number and perpendicular depth, any rupture or dislocation by external violence must be truly difficult; yet we see they are reduced and diminished in breadth by the shoeing, and suffer along with the other elastic parts of the foot; and that they are also subject to become disturbed and disorganized by inflammatory actions, induced not unfrequently by washing the feet in cold water when the horse has been heated by exercise, and suf-

fering them to chill; a violent inflammation then takes place in these highly-vascular parts, and a partial or complete separation follows: very hot summers, with the rigours of the shoeing process added, will together create fever in these parts that slowly dissolves their union; and after weakness, induced by any of the above causes, violent racing will alone be sufficient to disunite them and produce founder; as was the case with the Eclipse horse, whose feet are now before me, and also of the famous horse Worthy, and a numerous host of others, that their disturbance and separation is in reality not unfrequent.

These plates, or lamellæ, we may also observe, are continued upon the surface of the inflexions or bars, see plate 3, fig. 1, serving to confirm the view we have taken of the relationship and continued nature of these parts to the wall. And it is not improbable that when the young horse is in strong action, and darting forwards with the velocity almost of a bird's flight, that these posterior parts of the wall of the hoof would play to the impression of his speed as freely as the young branches of an osier bent by the wind, and that by their sudden return again to their first position they would materially assist in his rapid career.

These lamellæ, or processes of horn, have been strangely called by some, laminæ, as though they were horizontally disposed plates of metal lying one over another in close contact, which can but ill apply to perpendicular sutures like these. We have therefore, to avoid ambiguity, preferred simply to call them the *Keraphylla*, or *horn-leaves*, and *The Keraphyllous structure*,* which the French have immediately adopted, and of distinguishing again those of the foot by the term *Podophylla*, or the *Podophyllous structure*,† which appellations we shall in future use, as their convenience and superior correctness will we believe be obvious, as well in avoiding any peri-

* From κερας, cornu, horn, and φυλλον, folium, a leaf.

† From πους, ποδος, pes, a foot, and φυλλον, a leaf.

phrase, as by the other numerous advantages of a proper distinctive name. We may here just remark that these last, the Podophylla, are not actually placed upon the coffin bone itself, but upon a dense reticular web covering its surface, (the *reticulum processigerum,*) which we must leave for description with the attaching parts.

In farther pursuing our view of the interior surface of the hoof, we are led to notice the hollow or depressed semi-circle at the top of the hoof: see plate 2, fig. 3. This cavity serves to receive an indurated and enlarged process of the skin, which entering it, is securely lodged there, and becomes the secreting organ of the wall of the hoof. The surface of this cavity is seen everywhere besprinkled with innumerable small pores, often arranged in transverse lines, but more frequently without any distinct order; and we may observe that these pores, though small, are immensely large for vessels not carrying red blood, but colourless lymph; however, in rasping the hoof away deeply near the top, we often see red blood to flow before we arrive at the quick, which serves to show that some of them will admit the red blood for some little distance down them. Perspirable fluid is elaborated in these vessels, which is shown by putting a cold metal plate under the hoof, which collects it abundantly. As this depressed circle passes backwards in the hoof, it becomes wider and more shallow, especially at the inflexions, which probably adapts it to the more extensive and varied movements of these parts where it abruptly terminates.

The hardened, or more cartilaginous skin, which fills this part, has been strangely mistaken by some for a ligament, though neither in structure nor in office has it the least approach to this description of parts.* In order to speak of it without a circumlocution, I have given it the name of *Cutidura,* and the cavity containing it, the *cutidural,* or *cutigeral* cavity, and which the French have also adopted; and in every animal having hoofs, claws, or even nails, a simi-

* See Coleman on the Foot of the Horse, p. 225, pl. 3, g, g, g.

lar part will be found. It is probably the skin hardened and divested in some measure of its sensibility, in order that the impressions upon it, which must be strong, should not be too much felt: for it is a perfect continuation of the skin, and without any interruption whatever: it is true the groove, into which the frog-band enters, is situated just above it, and which has occasioned no doubt these adroit anatomists to carve, *mal apropos*, a division there.

The pores seen in the cutigeral concavity, I need hardly observe, are the openings or orifices of an infinity of capillary tubes, of which the hoof is composed, and serve to convey the vessels for succulence and the perspiration of the hoof, and for maintaining its toughness, and where these vessels terminate, and the access of nutritive fluid ceases, probably, there the horn loses its coherence and life, and falls away; which may perhaps explain the natural course and also throw light upon the singular phenomenon we so often see of morbidly lengthened hoofs to such a remarkable degree, as to lose entirely their proper figure, and to turn up in front, in horses as well as asses; in which case perhaps it is that these vessels, from some morbid cause, are lengthened out in an extraordinary degree, which permits the hoof also to follow the same course. We observe this process generally in animals that have been sometime shod, and then are left without shoes; and we may remark, that in shoeing, the iron, by being driven with great force directly against the openings of these perpendicular tubes, must effectually close them, and arrest all transpiration through them: whether such obstruction may in some feet influence or contribute in any manner to this morbid affection I know not, and leave, having mentioned it, to be ascertained by future research: sometimes though rarely however in natural feet, with the ass more particularly, this morbid growth has taken place, we believe, without their having ever been shod.

And these filiform vessels which enter the wall of the hoof are of a nature longer than those of the sole, hence its greater length, whilst those of the sole being shorter and quickly perishing determine

its relative thickness to be so much less, at least, such appears to us at present the most probable solution of this phenomenon. The wall of the hoof will also admit, though but imperfectly, a division into two longitudinal tables, the exterior one more hard and variously coloured, and the interior one white or colourless, and is much softer, and as it passes more interiorly is disposed into parallel lines, which at length become the detached foliations of the keraphylla, which are however secreted along with it in its formation at the coronet, and this along with the rest of the wall of the hoof is apparently given off by the cuticle, or perhaps rather by the same cutaneous vessels as secrete this universal covering of the body.

This cutigeral concavity in cases of founder, where the internal or sensitive foot sinks down within the hoof, is in part or wholly obliterated, and we see in its place an extended flat surface of considerable width, and the hoof in this case becomes ribbed, wrinkled, or deformed, or grows to a thickened shapeless mass of horn, and the coffin bone also sinking and losing its place, and its sharp edges being absorbed, it becomes rounded, and at length reposes in an indented hollow formed in the middle of the sole.

Of the formation of the wall. This we have already stated is done by the cutidura, and is a production of the cuticle itself, or more certainly of the same vessels which form this part; nevertheless, all parts of the surface of the internal foot can produce horn, as we plainly see when horn has been removed by any circumstance from the sides of the foot, horn will form there, and so wonderful are the resources of nature, that if the cutidura itself has been removed, as in quittor cases, the skin then assuming its office, will form horn, though the horn so formed does not appear so well organized as when formed by its proper natural cornifacient agent, and on the removal of a sand crack, even the cutidura shall throw out a shapeless lump of horn, which is by the succession or after growth from the coronet at last reduced to its proper thickness and original dimensions of the wall.

To prevent the very disastrous consequences which would attend a separation or detachment of the cutidura from its adherence to this cavity of the hoof is one of the very important offices of the frog-band, which, passing over it, secures this tender line of connection, that rough bodies grazing along the surface of the hoof should be carried by this means safely over it to the skin above.

Of the composition of the hoof. The wall of the hoof in its structure will be found, we believe, to be very simple, for it appears to consist or is made up entirely of threads or hollow tubes of extreme fineness consolidated and glued together in parallel lines by interposing horn, that if we wanted a true notion of this construction, we may fancy to ourselves, a lock of hair, which are so many tubes of horn, immersed in glue and then dried and it would give us a mass very strictly analogous to the horn of the wall, and the sole appears only to differ in being shorter in respect to these tubuli or filaments of vessels passing into it, it is however of a much softer, coarser, and looser texture as to its horn, and therefore, more elastic, which its office seems to demand; and the immediate organ or agent of its secretion appears to be a process or elongation from the skin brought down thus far for the purpose; this, we think, we have decidedly observed in carefully dissecting this part.

And we may further remark in terminating this description of the wall, that if by any accident the podophyllous and keraphyllous structure are both destroyed, this fine organization is not again renewed, but the reparation is made by a plain, smooth, flat, surface of horn not duly organized.

It appears also important to observe in respect to this part, the wall, that it can have characters wholly at variance as is the case in respect to the high and lofty or upright hoof, and the hoof that is extremely flat, and so different are they that they seem to require a different management in the shoeing and treatment, also in rearing. Since all the parts of the very flat hoof are thinner, weaker, and requiring a lighter but more extensive bearing and defence than does

the upright foot, and the shoeing is not only advantageous, but almost necessary to such a foot, but to the very upright it would be often superfluous, and is in its effects more rapidly injurious, and also too much wet in rearing the flat hoof should be avoided, which cannot do to the other so much harm.

It also appears to me, that it would be attended with many advantages if we should give to this important member of the hoof, the wall, a distinctive name that would bear the inflections of language, as we could then at any time detach it, and separately consider it in its relations to the other parts; and for this purpose we have appropriated to it the term *Onuchus*, which can be employed adjectively, which the term *wall* could not: its use in facilitating our remarks may be seen in the following examples. The *onuchal* part in the foot of every animal determines the form of the rest of the hoof, and gives the law to the other parts. Existing singly, it constitutes *a nail*. With a sole only it forms *a claw*, and when pointed and incurvated, *a bird's claw*, or talon. And with a sole and frog, it makes a complete and most perfected hoof. Onuchal disease will mostly lead to a distortion of the other parts of the hoof. Bi-onuchal inflection, or double inflexion of the onuchus, is peculiar to the horse tribes, &c.

Having now shown the general form of the wall of the hoof, and noticed in succession all its parts in a way not before understood, we proceed to its next member, the frog, which we shall see has been as little understood as to its real structure, and, miserably for the animal, still worse appreciated in respect to its functions and office.

Of the Frog.

As this part of the foot has led to more mistakes in the shoeing than any other part of it, so we shall bestow upon it the more care and attention to exhibit correctly its structure and economy, in order that it may not suffer any more punishment by the cruel batterings and squeezings that have been so unmercifully proposed for

it by the unaccountable misapprehensions of these colleges, where nonsense is taught by authority and widely disseminated, and where men have hitherto really been placed officially to teach an art which they had themselves yet to learn, and where, instead of delivering their opinions with a suspicious diffidence and wariness, from knowing their real situation, they have uttered their absurd dogmas with all the confidence of well-ascertained truths, and afterwards, though plainly confuted, have persisted through pride in maintaining them. And it is lamentable to think of the hundreds of young men that have been thus misled by these teachers, and of the thousands of horses which have been punished, bumpt and thumpt upon their frogs through their impenetrable obstinacy and folly. And what is worse, when the truth in clearest evidence lay before them, instead of embracing it joyfully, they have tried in every way to stifle her by wilful misrepresentations and the abuse of those who had espoused her cause; and next to these miserable courses they have added a barbarity, surpassing in refined cruelty even the unsoleing or any other cruelty ever proposed by the old farriers—that of nerving the horses legs when they were not relieved by their injudicious measures; and so destroyed the very fundamental properties of the foot, instead of pursuing the natural and most obvious means of prevention and relief from the evil which new and undeniable discoveries had sometime since presented to the world, and which had been confirmed by very sufficient testimonies of men no way interested in the affair, otherwise than by a desire of serving the cause of truth and humanity; and from seeing and deeply feeling the very great injury done to the animals as well as to the public and ourselves, we cannot on such an occasion but express warmly our natural and, we believe, just indignation at such conduct.

In now presuming to unfold this curious part, the frog of the horses foot, we may observe, that we enter upon it with the more pleasure and confidence from having in former years been permitted to disclose several of its parts not before known or understood, and

Horizontal Section of the near foot of the Horse, to shew that the Wall at its extremities is inflected. Clayton's Dissert.n p. 18. 19

Perpendicular Section exhibiting the Frog [illegible] and the open natural Foot

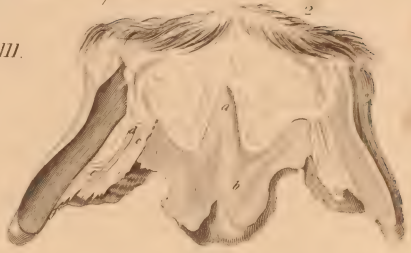
Plate III.

1

a. The Wall. b.c. The Inflections passing to the Point of the Frog. d.d. The Frog. e. the internal Frog. f. The Frog stay not yet completed. g.g. The line of union of the Frog & inflected wall. h.h. The frog embracing the Ends of the Hoof & forming above, the coronary frog band. i.i. The Elastic processes. k.k. The Pores of the Sole. M. the Coffin Bone.

Syd.m Edwards Delin.

2



a. The Frog stay. b. The frog. c. The bar, or inflection. d. a Yellow [illegible] it to the Sole. e. The Sole. f. a Yellow Horn uniting the Sole to the Wa[illegible]

3

The Contracted Foot [illegible] The Frog stay natural [illegible]

we now hope to add to it a more full account of its real functions and construction, nor should we be disposed thus particularly to lay claim to these things if not driven to it by experiencing that we have nothing to expect from the liberality, or candour, or truth of these colleges, who have endeavoured to bury and conceal them, but who, had they understood their true interests, would have been the first, as in duty they were bound to be, being paid for it, to extend their aid to us in promulgating them and in forwarding their application to the services of the animals and of mankind, instead of, by bad preparations of them, or none at all, concealing them and misrepresenting them, and by giving to their class mean descriptions of them, making them to appear as of little or no importance, almost as though the Almighty had been indeed insufficient in his works.

As we have already seen that an interruption or break to the continuity of the horny circle becomes necessary for the purposes before stated—of destroying resistance in this part of the foot, so this singular organ is provided to fill up the triangular chasm left by the ends of the wall being inflected towards the centre of the foot instead of meeting at the heels, affording thereby full efficiency to this beautiful design: see pl. 2, fig. 2, and pl. 3, fig. 1.

Now the frog is every where attached to the upper edges of these introverted limbs or bars, which in passing downwards, are also seen to be reflected outwards; and by this direction disposed away from the sides of the frog, in order clearly that it should not suffer compression from them: and we may remark, that the very reverse of such an arrangement would certainly have been the case if the frog had really been destined to the office of acting against these inflections to force them open, as the frog-squeezing advocates have imagined. We may again observe that this part, the frog, narrows also downwards as it proceeds from its attachments or insertion, and consequently still renders wider the space between, and makes their contact next to impossible in any forcible way, the reverse of all which would have been the case had any such office as that of forcing the in-

flections open been intended. And the sharp part of this supposed wedge is turned to the ground, and not to the object it is supposed to act against. And further, if we look at the base of the frog, which part has its great width, matter and power, we there see a hollow cavity, being the base of the frog-stay. Now would any mechanic of common sense make a hollow space in the very point of the chief resistance of his wedge ?

In my early studies at this college, as it is called, I was also led into frog-squeezing notions, derived I know not how, but I believe from St. Bel, and these ideas held me for some years; becoming engaged in actual practice, the best of all teachers, where there is reflection and openness to conviction, and a distrust of reasoning; I first was led, from seeing bad effects from it, to doubt the truth of this fascinating delusion, which ended soon after in a conviction of its fallacy.

I was next led to consider what part in the structure of other animals this frog could be allied to, and referred it to a correspondence with the central pads in the feet of the digitated animals; but afterwards saw also that this in some respects was not correct, since the pad in the dog and cat's foot is designed for a primary impression on the ground for the impulsion of the animal; but not so the frog of the horse, for it clearly would not have done for an animal of such weight, and destined to be of the first order of fleetness, to depend on soft parts for his primary impulsion, as such softness would certainly have very much paralyzed, if not entirely destroyed, its effect. It was necessary, therefore, he should have a more solid point, or range of points rather, of bearing for this purpose, and which is fully afforded him in the solidity and more extensive circuit of the hoof.

It may be remarked, however, that this part is really analogous in some respects to the pads in other animals, for it consists of the same materials, viz., horn, ligament, tendon, and resilient elastic stuffing: these, however, are beautifully separated into classes in the horse, forming a much more elaborate and noble design than in the pads, where they appear almost, if I may be allowed the expression, heaped

together and inordinately mixed. The horn also of the frog in the horse is pure and abundant, and not that cartilaginous horny skin which is found with the pad. The frog also appears to be more posteriorly placed in the foot of the horse than the pad is in the digitated quadrupeds, that is, in relation to the whole foot. We now take an external view of this interesting and somewhat anomalous organ and of all its parts, their various uses and abuses, with a summing up of the evidence upon the question of frog-pressure, and shall conclude with giving the various names that this part has obtained among different nations.

In turning to the frontispiece, or plate I., the reader is presented with an interesting view of the frog of the horse's foot, and it is the first time, perhaps, that this part has ever been very truly represented; it is, indeed, a view of the organ at five years old in its perfectly natural state, unhacked, and unsliced, or in any way disfigured by the workers in iron.

In its general mass, it appears of a lozenge or triangular form, and its sides growing narrower, are seen sloping away to its summit, or rather, indeed, its inferior surface. This inferior surface is flattened, and in the middle a little depressed, beyond which a considerable bulbous enlargement appears, and from which it suddenly narrows to a sharpish point, and terminates.

The above rotundity, or swell of the frog, rising considerably more to the light than the rest of the surface, is sufficiently conspicuous; it is, however, almost the only foot in which I remember distinctly to have seen it, for it is the only foot at five years old that I ever saw that had not been in one way or other mutilated by the smiths, and at an earlier period than this all the parts of the foot are not developed. On making a perpendicular section of the foot through this enlargement, it is found nearly opposite, or under the *shuttle bone*. A two-fold purpose is combined in this structure, as in most other parts of this exquisite piece of mechanism. It appears as though provided to defend the important tendon passing under the above

bone from injury: and it contributes by its pressure to give support to this tendon, by pressing against it at the moment of its greatest extension, which takes place while the foot is on the ground impelling the weight of the body, and prevents it from being torn from its attachment, or breaking at the sudden turn here given to it in passing beneath the coffin-bone; and it doubles the force of its attachment, or more than doubles it, if the strain be more, for if the pressure of the ground permit it, it will be proportionate. It also serves to defend the joint formed by the two foot bones, and the most important soft parts of the foot.

By way of distinguishing this useful part from the rest of the frog, we have familiarly called it the *Cushion of the frog*. In young feet it is not very distinguishable.

The frog, a triangle of elastic horn, has the effect of, and may not be inaptly compared to, an elastic key-stone received into an elastic arch, communicating, in some cases, and admitting in all, the springing movements of such kind of arch. Its base, from its width and quantity of matter, possesses the full capacity of its motion along with the inflections, but which is gradually lost in approaching the centre of the foot where there is less occasion for movement.

If we observe the base of the frog in the engraving annexed, there may be remarked about the middle of it a pretty considerable cavity or excavation, the edges of which are truly represented with rising lips or prominent margins of stouter horn: this hollow is termed the *Cleft of the frog;* (see frontispiece;) the sides sloping pretty suddenly, form a longitudinal line at the bottom of the cavity, thus terminating it.

This cavity appears to serve the following useful purposes. It is a safe-guard from rupture between the two halves or divisions into which the foot is almost separated at this part; by closing when pressure comes direct upon the underside of the frog, it prevents too much condensation of the horn of this part, and consequent pressure, and a too solid resistance upon the soft parts beneath; when the foot

bears partially on the ground, as by one side only, which will happen occasionally where the surface is irregular, it can then extend along with that side of the foot without rupturing, by the greater liberty it thus affords to the part, and the strength of its margin secures it from laceration. This Indent or Cavity may also in soils of a looser nature hold the foot more firmly, by the irregularity it offers to the surface; as in loose ground, sands, clays, &c.

But what we could wish to have more particularly noticed respecting this cell or cleft of the frog is, that it is prevented from rupturing inwards towards the quick by a stout considerable cone of horn passing directly from it into the sensitive frog, and of which cone this cleft will be found to be only the hollowed base: see pl. 3, fig. 2, *a*, *b*, which is a perpendicular section presenting an excellent view of it. It is also worthy of notice, that this solid cone of horn, though passing within the sanguiferous and sensitive parts of the foot, is nearly or quite as hard and tough as is the horn in the exterior of the frog exposed to the air, in order apparently to give it efficiency in resisting rupture from external assault. And this cone, we may observe, commences nearly opposite to the termination of the heels of the coffin-bone, assisting the duplicatures or columns of the inflections, in strengthening these posterior parts in the absence of bone: the posterior blunt end of the frog-stay is adhering to the middle of the curtain of the frog.

The sides of this cone are somewhat compressed or flattened, and its upper and front edge obtusely sharp. This part was not much attended to before, and being without even a name, I gave it the epithet frog-stay, which the French have also adopted, in calling it *arrette-fourchette*, from its closing the frog, and holding more firmly its halves together.

This singular provision, hitherto so little regarded, of the frog of the horse, seems to serve the purpose of uniting more firmly the two halves, of which the foot, at this part, really consists; there being a tendency to a division in the hind part of the horse's foot as in the

cloven-footed animals. And this part, though but small, is indeed truly important in the offices of the foot as well as its diseases, for this cone of horn not only forms the main barrier to the separation of the two halves of the frog when violence is offered; but what is more worth our attention is, that it appears to be this part when forced or destroyed that becomes the true source and cause of the *Running Frush*, and which well understood will lead us to a better knowledge of this disagreeable complaint. As we mean on some future occasion to give a more enlarged account of this matter,* we shall only state here very briefly the manner this appears to happen. When this cone is defectively formed by nature, as by the want of sufficient bulk, or by weakness of its contexture—when reduced or wasted away from the same evils that reduce and waste the general mass of the horn of the frog, as the pressure of the shoe—or becoming too brittle, hard, and dry, as from cutting and stable exposure, it is in consequence liable to be broken by external violence—or is decayed or weakened by much exposure to wet or filth;—in either of these cases its rupture admits a passage and lodgment for externally destructive agents, as wet, dirt, urine, &c., or even its own secretions lodging in the part are sufficient for this effect: these destroying the horn, at length reach the quick and sensitive parts, whose irritated surfaces produce the discharge in question; and thus the thrush appears to be formed: (see pl. 3, fig. 3, *t*,) where the frog-stay is in part ruptured, and the frush in its progress. Another view of this part, with the frog and band detached, is seen. (pl. 4, fig. 2, *k*.)

It may also have escaped the notice of some engaged in these studies, that an extension of the skin passes beneath the frog, and is the first part or surface that gives out the frushy discharge, till at length in bad cases it gets destroyed, and the more internal parts become affected. This curious fact of the skin may be noticed by

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* On Running Frush and Ring-bone. (London, 1821,) With a successful mode of curing it.

slitting open the frog and turning it back, when a process of it may be distinctly traced growing thinner as it approaches the sole.

It has been generally imagined hitherto, that contracted heels were the great cause of thrush; but we may remark, that the last stage or degree of contraction, may exist in feet without any thrush whatever: it is therefore not a necessary consequence of the contracted heel, but of the casual occurrence of certain circumstances which we have described; for the converse of this is also true, viz., that without any contraction at all there shall be thrushes, as in the young feet just mentioned, and indeed in grown up feet, and one contracted foot shall have it and not the other, though equally so, and of the self-same horse.

We hope this discovery respecting the nature of thrushes may not be unacceptable to those who are in any way interested about horses, as it sets in a clearer light the genuine source of a very obscurely-beheld and disagreeable complaint.

The *Frog-stay*, it is evident, will essentially co-operate with the coronary Frog-band next to be described, in keeping the whole structure of these parts together, and especially under circumstances that might tend to disunite them, as in the suction of strong clays, or in swampy ground, &c.

This part is much stronger in proportion, we have thought, in horses of the blood than in coarser bred horses.

Still pursuing our external view of this part as it is presented in the engraving, we are now about to describe a most singular provision of the hoof, which, though truly conspicuous, has strangely escaped an intelligible notice from all preceding writers on this subject.

In regarding the base of the frog in this engraving, we see on each side of it the columns of the inflections of the hoof very much foreshortened, and the frog is sending off laterally two stout processes of horn to firmly surround and envelope the sharp posterior edges of these inflections at their upper parts, and which form there two very dense rounded elastic bulbs of horn, (see letters *a* and *b*,) in order to

keep together and restrain any violent separation of these parts of the hoof, which would have been attended with disastrous consequences: we have also another view of these bulbs in plate 3, fig. 1, giving an horizontal section of them. Now we shall next observe, that by means of these bulbs, a connection is formed in a most unexpected and singular manner of the frog with the front of the hoof; for these wings, or lateral processes, continue their course round the whole line of the commencement of the hoof, forming a convex band which is firmly adhering to the hoof, and sending off its upper edge or margin above the limits of the hoof to be attached or deeply inserted into a fossa of the skin, and serving in its place a variety of very important offices: see pl. 4, fig. 1, its natural appearance, and at fig. 2, its appearance when detached.

One of its offices, we have formerly stated, that of securing the joint which is made between the skin and hoof from the imminent danger of a disunion by any rude body grazing along the surface of the hoof, and passing into it, which would by this shield be diverted from entering the joint, and be carried over it in safety to the skin above. It appears also to serve the useful office of keeping the thin tender upper fine edge of the hoof from growing dry and hard, and irritating the skin it is connected with; this part being ever, when in its natural state, and not changed by stable heats, or the fever arising from shoeing, of the most agreeable toughness, pliancy, and softness. I have however seen the smiths in their rage for rasping, nearly rasp away the whole of this band.

It has also the power of supporting the foot from too much sinking downwards within the hoof; and we may be able, by attending to this circumstance, to explain the extraordinary flatness of the hoof that has been long foundered, and arising from the pressure of this band upon its upper parts. And it will be found, therefore, particularly useful if we pay attention to it, in exposing and detecting the first tendency to this miserable disorder. It appears also to be rather broader, we have observed in the hind, than in the fore feet.

THE CORONARY FROG-BAND of the HORSE'S HOOF.

Plate 4.

a. b. c. The Coronary frog-band raised from the Hoof at b, with a plate of black Ivory inserted beneath it.

d. the left Bulbor termination of the foot of the Horse formed by an extention of the matter of the Frog filling up and passing over the inflected Hoof at its upper part, at the outside becoming narrower it forms the Coronary frog-band.

e. The inner side of the right bulb of the foot exhibiting a fissure in young subjects between the tougher Horn below exposed to the ground and the tenderer Horn above.

The frog detached; its bulbous extremities and the frog-band, also the Frog-stay. k.

Cruickshanks Del.

F. Sansom Jun.r S.

It absorbs moisture like a sponge, and when wetted by the grooms, I have seen it swell by the application of the water, and become sensibly more prominent, and assume a darker colour in consequence, whilst all the other parts of the hoof have suddenly dried, which from their feverish state they are in a general way but too apt to do.

It is probable this band is ever supplied with moisture from its connection with the vessels of the skin, and at times also, no doubt, from perspiration running down upon it. And one cannot fail to imagine, in the hot regions of the torrid zone, as of Arabia or Lybia, the native countries of the horse, and where the foot is immersed in burning sands, the great relief that a band so soft and pliant must afford to these tender parts.

A more important office still remains to be disclosed than any of the above, which is, that it acts as a powerful elastic ligament in holding the exterior edge of the cutidura all round the hoof securely in its place from the various assaults to which it is particularly exposed, whilst the interior edge or margin of it, is securely held by the Kerophyllous and Podophyllous structure, and its middle by the arteries entering the hoof.

Every one used at all to examining the hoof, or of dissecting it at least, must have observed, when the foot is drawn out of it, a projecting eminence of soft horn with a channel inside it: this is the upper edge of this band. And this appearance we had often noticed in our dissections with a degree of surprise, and but little imagined it was a separate part of the hoof, and without once suspecting its origin; nor should we probably have discovered it, but from accidentally making, without the expectation of any such result, (for we cannot look for a part of which we know not the existence,) an horizontal section with a saw through the middle of the inflections; the loose edges of the bulbs then presented, and conducted me to the band, and showed their connexion; and the inflected nature of the hoof immediately also became apparent.

It seems to be intended to unite the sensible parts with the insensible, that is, the solid hoof with the tender skin, which its pliancy

and extraordinary softness peculiarly fits it for. It also serves strongly to bind these upper parts of the hoof together, and to assist in holding the frog and its bulbs more firmly in their situation. It receives great strength from being attached to the surface of the hoof in nine tenths of its width, as paper glued to a board partakes also of its strength; and the difficulty of rupturing it, or of drawing it out from its lodgment in the skin, also manifests its power, and its very various offices sufficiently bespeak its utility and advantages.

A book, a very big book indeed, on the foot and shoeing, has been published some time back in Paris, by one Jauze, of the Alfort school I believe, who declares this band to be no new discovery at all, for that it was well known to Bourgelat and to the French veterinarians, and that it was nothing else but his *bourrelet graisseux;* thus showing his total ignorance of the part by mistaking it for the *cutidura;* which is in reality no band at all. This, with other malevolent remarks of Jauze, were very neatly answered by my friend, Professor Huzard, jun., in a small work, entitled, "*Quelques Observations,*" *&c. Paris,* 1818; who afterwards signified to me that they were not really written by Jauze himself, but by one of the pupils of Alfort, and that he only was weak enough to father them. That my own countrymen should not fall into the same error, I wrote, in the first edition of my work, the following sort of manifesto or warning, which I should not have repeated in this edition, but as it serves to show the *animus* I then had towards Coleman and the college; a place I acknowledge I once studied in with great delight, and wish I could still continue to praise it.*

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* In the works of Professor Coleman there is a Coronary Ligament described and figured, Plate 3, p. 225, *g, g, g,* vol. II. on the horse's foot. This ligament, I at first apprehended might be the *Frog-band* in question, but on examining the description of it, it appears not at all to accord with the part here given. The *Frog-band* in no respect partakes of the ligamentous texture, but is of nearly or quite the same matter as the horn of the frog; neither is it lodged in the coronary concavity of the hoof, the concave part of the hoof, where this ligament is said to be found, has ever appeared to us

Now I am, as it were, rather upon French ground, I may here just observe also, that honest Professor Girard, after having done me the honour of consigning my discovery of the elastic principle of the horse's foot to his countryman Lafosse, supporting his arguments by false quotations taken from a purposely corrupted *English version*, by one who knew little or nothing of the French language, which any one, reading the original work, will in a moment see and detect the injustice of this piece of unprovoked and illiberal dealing on his part, and insinuating my nameless obligations to some Frenchman, also nameless; and after having thus handsomely prepared his way, he next quietly purloins the above band into the second edition of his own work with nearly every other observation of mine of any value, and without making scarcely a single note of commendation or acknowledgment! It is with pleasure, however, that I have to record the very reverse of this conduct in a private French veterinary practitioner of Paris, M. Crepin, one of the editors of the *Journal pratique*, who, in

to be filled up simply by an enlargement or process of the skin itself, that is, the *cutis vera*, not separable in any way by dissection, or maceration, or any other means we could devise. One should apprehend it was some inadvertence of the dissector, who had by the knife formed the skin into this appearance. In suggesting, however, this probability of an error, (if it be one,) we could desire to elicit the truth by further inquiry into these parts, for they have been really but little examined; and in doing this, we could wish to testify our respect for the head of an establishment we ardently wish to see flourish, and whose works alone we have thought deserving of notice; and ask but the same charitable construction on our own errors from others. Indeed it is high time the wretched style of declamation and abusive writing on these subjects should give way to a better taste—that of real investigation and research, as in other objects of a scientific nature, by which alone the art can receive any useful accessions, and the horse be benefited.

The empty verbosity of style alluded to above began about the reign of Charles the Second, or a little earlier, and has continued with few exceptions ever since. It was unknown before this period, and was in reality the natural produce and legitimate offspring of jockeyism and the race-course. How little has been added to our knowledge by such writings may be readily seen, and in what a disgusting light they begin already to appear.

public and in private, has made an unreserved avowal and acknowledgment of his estimation of these discoveries.

The importance of this principle, which the French so contend for the discovery of, does not seem yet to be at all felt in England; smothered up by college tricks, it seems indeed of so simple and abstract a nature, as to be almost nothing; and it was long after the effects of it were familiar to me before I could give it a definite name, or what these effects I had witnessed should be referred to; it is the term, *elasticity*, however, which by its exercise and use will explain, like the principle of gravitation in the hands of the astronomer, nearly every thing that before was dark and obscure in the arts of the foot.

This band is not very large at two or three years old, but acquires its size with the growth of the frog, and along with it completes its bulk and form.

I have seen in the foot of a cart-horse the horn of the frog-band extending nearly half way down the hoof, which seemed of use in protecting it from too much dryness; and it is remarkable how long moisture will preserve it from falling off. And I have also observed in two or three cases, where from a tread or a quittor, this band had been detached from its connexion with the skin, and also from the hoof, and was exposed to the pus and secretions of the sore, that it swelled to the thickness of the little finger nearly, and strongly resembled both when handled, and in appearance, a mass of chaoutchouc extract, or Indian rubber, and keeping up a considerable irritation to the ulcer beneath it, so that it became finally necessary to remove it, or at least divide it. And I have seen also the discharge from a bad frush occasion the frog-bulbs to extend and cover over the inflexural columns quite down to the ground from the moisture thus afforded, instead of being naked half way up as they usually are seen.

Having been the first to describe this part, so I have ventured also to give to it a name, having called it the *Frog-band*, or *Coronary*

*frog-band;** but as this appellation will not apply to other animals which have no frogs,—for it is universally found represented in some way or other in all animals whose extremities are terminated by horn, —to meet therefore such a general claim, I have bestowed on it the term *Periople*, from περι, *circum*, and οπλη, *armatura*, or the hoof. By which we can freely communicate all we wish respecting its properties or structure without a periphrase, as in the following examples. The thin edging or cuticle, as it is thought to be, covering the water whale, or root of the human nail, is in fact a *perioplic* rudiment. A *perioplic* covering for the conjunction of skin and horn seems to pervade all nature; but in the horse is seen the perfected fulness of this member in all its functions and structure. Abrasion of the periople is attended with excessive irritation, a case of which we once saw in a horse, nor could any unguent or emollient supply its place.

This band suffers when the other parts of the hoof are affected, and then often makes a dry and withered appearance,—as by the effects of shoeing and stable feed and air; but against black hoofs it is often a most conspicuous object. It also appears to have the power, if kept in too dry a state from heat and fever of the feet, to contract

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* This part was invisible in the museum of the college when I visited it some years ago, and afterwards only a most miserable specimen could be seen of it; and on conversing with more than one young man of the fully qualified and diplomatized of the college, I could not find that they had any distinct ideas of the existence of such a part: so very communicative is a privileged royal school for the promotion of knowledge. Surely Pitt did well in rejecting the proposals of Dr. William Hunter for framing a government national school for *professing* and teaching physic. The sciences and arts certainly want no such aids, or rather, impediments.

And I confess I felt it a little hard, after making so many unquestionable discoveries, and the expenses I had been exposed to in one way or other with these animals, that no proposition for a reward, no expression of favour, ever reached me from the college, though every year we heard of the great pecuniary rewards that were being showered upon the professors' partner, William Sewell, for pretended discoveries he had made, but which we could easily have shown, had we been consulted, were no discoveries of his at all, and of which he never dared to make any public avowal, or to give any description.

forcibly upon the hoof, and occasion lameness, of which we apprehend we have seen, with other practitioners also, various instances.

It seems to have its origin, and certainly derives its succulence from the skin, to which it forms a strong adherence; being secreted along with the hoof, it descends along with it by the growth, till at length, losing its succulence, it becomes dry, withers, and falls off, leaving, as we have stated, a beautifully-polished epidermis to the hoof. The formation of an epidermis within a covering of this sort is also, we believe, a rare occurrence.

On the structure of this band. We have not hitherto paid that close attention to it we could wish, but believe, from what examination we have had time to make, that it is formed of reticulated threads of firmer horn, chiefly longitudinally disposed, and filled in with a highly elastic gummy horn, very much affording the same feel as the Chaoutchuc extract, or India rubber; it is evidently derived from the skin, and is probably capable of arranging the secretions from it into its own organization, and we are also led into the apprehension that the curious structure of the hoof, and the keraphylla especially, are obtained in the same way, but leave this suggestion with all incertitude for farther inquiry.

There is a thread-like artery runs between each leaf of the Keraphylla and Podophylla: this artery is probably the immediate secreting agent of these parts. This is rendered the more probable from the Keraphylla at their summits not being so wide as they are lower down; it is therefore clear they must at any rate receive accessions after they quit the coronary circle.

In the cloven-footed animals there is clearly no distinct frog; there is, however, a part which answers its purpose in each claw, occupying in the pig, for example, a space equal to two thirds of the sole, being a projected, thinner, and more elastic horn than the rest of the under surface of the claw, and from this proceeds the band.

Still continuing our general exterior view of the frog in the engraving, we see on either side of it deep longitudinal excavations,

formed by the recedence of the inflexions; these, as we have formerly stated, we term *the cavities of the commissures of the frog*, and having described them with the wall, shall not again repeat them here, only to observe, that the frog, as an elastic part or body, would in vain have been elastic without this space for its operations or for the exercise of it. These cavities, however, are in part closed at their posterior and upper parts by an extension or process of the base of the frog, which is passing over them to form the bulbs: and these parts, by way of distinction from the other parts of the foot, we have called *The arches of the commissure*, for it is these arches, the smiths without understanding them, cut away with their buttresses, when they get embarrassed by the falling in of the hoof; pretending *they are throwing open the heels;* though it obviously is the very surest way to contract them; for denuded parts, exposed to the air, ever dry and diminish in volume, as well as the more we weaken parts, the more are they forced in by the iron shoe.

We may now discover that the hoof of the horse is formed simply of two circles of horn, the one of hard, the other of soft horn; the latter running everywhere round the upper edge or margin of the hard horn, forming however, between the two inflexions the singular body we term the frog, which, as we shall see hereafter, is in the fœtal part merely a lax membrane lodging between these parts, permitting the bars or inflexions almost to approach in contact, and so diminish the volume of the part in the womb. And the bulbs also are in this early state regularly finished members extending over a portion of the sole, as we shall explain hereafter.

Seen from without, the frog makes a bold projecting appearance, as though it were a solid body of horn; and the smiths, certainly deceived by this appearance, entertain but indifferent notions of its real structure; for it is in reality an inverted arch only of horn, that is, turned downwards and reversed in respect to the general arch formed by the sole and bars, that its real thickness in horn is not so considerable as on a first view it would appear to be.

The frog seen from within, that is to say, when the foot has been drawn forth from the hoof, presents a simple inverted triangular arch so intimately connected with the bars, that no one would suspect it of being a distinct or divisible part; one uniform uninterrupted porous surface being every where observable on this inside. It may, however, be exhibited as a distinct inserted part, by making an horizontal section of the foot through the union of the bar with the side of the frog, when the difference of their structure and appearance, and the line of their applied surfaces become sufficiently visible and distinct. A hoof exposed to the weather will also be seen in its decay to separate at this part first, so that it is assuredly a very distinct part from the rest of the hoof. By actual admeasurement in several instances,—for they are indeed at present truly rare of nearly perfect feet,—we find, in a remarkable manner, that the base of the frog occupies a certain division of the general circle of the hoof, and that this division is about a sixth part of the whole circumference of it: by knowing this fact, we are not only led to entertain more just notions of the form of the foot, and the proportion of its parts, but it affords us also an easy means of forming a pretty accurate guess of what injury or diminution the foot has sustained at any period of the life of the horse, without having previously seen the original state of the frog.

Having now seen all the parts presented to the eye in the exterior of the frog, and explained the true cause of frushes, we shall now pass to other particulars, not at all less necessary to be understood, of the œconomy of this part, as to its growth and casting off the excess of its growth, its exfoliations at times, and especially its abuses from an ignorance of its natural properties and powers, which views will tend to displace some hitherto generally-admitted doctrines in the practice of the shoeing art. At any rate, being once clearly stated, they will appear upon the carpet of investigation, and receive confirmation or rejection as they are founded in truth, or otherwise.

Of the growth of the Frog, and the abominable practice of cutting and slicing it. The frog has appeared to us to be naturally slower in its growth than the other parts of the foot, and it seems in some feet to be nearly or quite arrested in its growth by the effects of shoeing, notwithstanding this, and although there be in a general way rather too little than too much horn, yet are the farriers ever slicing it with their buttresses, and denuding it almost to the quick; and it is the current opinion of these men, wholly ignorant of its œconomy or structure, that if left to itself "it will run," as they express it, "all over the foot;" therefore they pare it to keep it in due bounds. Their statement however, is wholly a misapprehension, and exhibits only their total ignorance of the resources of nature in the œconomy of the part; for it possesses the perfect power of maintaining its own figure without any assistance from art. If it was otherwise, every horse from overgrowth must become a natural cripple; therefore the Almighty Framer of the animal has also given to this part the power of throwing off in branny scales, or small flakes or dust, the superfluous growth, after the prescribed thickness of its horn is accomplished. The proof of it lies before us in the very frog we see here represented, which for five years of unrestrained growth by any artificial means, presents the beautiful surface we see it possess.

Nor need we be surprised at this, since it is the same with the sole, which would from concave become convex by overgrowth; but having passed the assigned limits of its thickness, it loses its tenacity and coherence, forms into flakes, and falls away, thus preserving without human aid (which in a state of nature it could not receive) its natural form, and in which property the frog also is concurring, though in rather a different way, suited to the peculiar nature of its horn.

That this idea of the smiths is perfectly groundless, and without the smallest foundation, at least in a general way,—for we may remark there are now and then occurring large relaxed frogs of a pro-

digious size, that seem an exception to this rule; they are however so rare, that they ought not in the least to disturb it. They occur principally in large draft-horses bred in low swampy situations; and so little frequent are they, that in several years attention to these objects, we have not met with more than three or four of them in some thousands of horses: that unless it may be to some who prefer reasoning from an exception rather than a general rule, they cannot invalidate the prevailing truth of the conclusions here drawn; and even these relaxed and weak frogs demand the horn that covers them, which is of a softer nature, suited to their defence as much as the harder horn usually found with frogs is required by them, that this idea of the frog requiring to be cut, in order to prevent its running over the foot, can have no real foundation. And if what we have stated be true, it should produce an essential change of measures for the better in the practice of this art, and lead to important results, since they are the errors of an extensive and daily practice, we could wish, therefore, in a more particular manner, to direct the public attention to them.

Next there appears a more plausible motive for cutting the frog, which is this, that from the defence afforded by the shoe, the parts of the hoof which are constantly growing, and having no means of wear, they must be removed before the shoe be applied again; and the sole indeed is held so firm by the nails embracing the wall, that its flakes have not the opportunity of discharging themselves, and will indeed want removing with the knife, as does usually a portion of the sole, which thickens under these artificial circumstances, and the frog of course, say they, should undergo the same sort of discipline in being pared with the other parts; and this reasoning has met with acquiescence from the commencement of the shoeing art, probably, to this day. The projecting solid appearance of the frog—its consistence resembling that of leather or hard cheese, cutting with a smooth and polished surface, invites the knife, and causes it to be more sliced on this account, we apprehend, than it would otherwise be, and the

workman fashions it to the conception he has formed in his own mind of the figure this part should receive. Now this proposition or reasoning of theirs is not so much to be complained of; I would that their reason was always as good in all other instances, though this is too much to expect in the uneducated, as we daily have reason to see. What we have in this respect to advance will, we believe, carry a conviction of the propriety of a different doctrine as to this part, and more suited to the peculiar nature of it, which is this—that the frog, naturally slower of growth than the other parts, becomes after a time from shoeing almost stationary as to its growth, and diminishes in some degree from the first application of it. That its growth is impeded, or rather wholly stopped, after the foot has been some years shod, we may be assured of, and in what degree it is so, by marking or cutting a small notch upon its surface, which we have found by experiment to take very many months to grow out. Indeed we once closely watched the frog in an old horse, which frog had been considerably diminished by long shoeing, for several, as eight or nine months, without any instrument whatever having been suffered to touch it, and at the end of this period, the frog was not visibly larger than at first; and this singular fact can, we believe, admit of an explanation. The wall of the hoof, we may remark, where there is a demand from its wear, grows rapidly; as when in a state of nature, and exposed to the ground; but shod, it loses this power in so great a degree, that in many horses a few thin slices only can be removed at each shoeing, after the interval of a month or five weeks, in which time twenty times as much horn would have been produced had there been a demand for it; so that the arrestation of the growth of the frog (which is of slower growth than the wall) is not so surprising, especially if we reflect that, the hoof closing from the compression of the shoe, the frog becomes squeezed laterally, which weakens its nature, and its cut surface also drying and hardening, compresses it also in every other direction, that its circulation and health being affected, the failure of its growth appears to be a neces-

sary consequence: so that it is from these circumstances we are led to infer that the frog, from the moment of the commencement of shoeing, will, without any cutting at all, diminish more than fast enough.

But, like most general rules, a discretion may be necessary in some cases. A deeper and larger frog than ordinary will at times occur, that will reach even below the shoe. In this case a thicker heel, or, which is better, a shoe a little turned up, will always prevent it from too much battering upon the ground, and this difficulty is not very often occurring.

We shall next consider another alleged motive for cutting slices from the horn of this part, which is, to remove *the rags*. Let us now see what these rags are, and how they are formed, and we shall then in truth see whether this be necessary or not. That there is no rag nor scale in the frog presented to the reader is evident by the inspection of the plate, (see frontispiece,) which gives a precise copy of its surface; and so it is almost ever found to be in the generality of frogs at the commencement of shoeing the feet, if a slice be taken away from this part, its exterior coat removed, and interior one exposed, which, being of a moister and more succulent nature, quickly dries in the air and heat of the stable, and contracting, cracks; the edges of the crack, in drying, reflect or turn back, and create an uneven ragged appearance of the frog; this they remove by a deeper incision, getting nearer and nearer to the quick at each cutting; till the frog, flayed and diminished in its size, and dried and brittle, becomes too tender for the contact of hard bodies, and thus, earlier than there is any occasion, is created a source of grievance and danger in the use of the horse, and thus are these rags formed;—or, at other times the horn cracking through to the quick, wet cankers the foot; or in other cases, as we have sometimes observed, the frog contracting under this procedure more rapidly than the quarters can follow it, an entire separation at the commissure takes place, with fatally-destructive consequences.

Still this recommendation of not cutting the frog, without being further explained, might appear similar to the usual recommendations on this head heretofore given in most books on these subjects: there is this difference, however, that their apprehensions were directed solely to the quick or living part of the frog, lest this should be too much exposed, admitting at the same time the propriety of the smith's opinions about over-growth and rags, which they considered as really creating a necessity for its being pared. Our view in not cutting is to preserve the exterior of the frog as entire as possible, having proved that there is no fear of its passing beyond its natural figure and assigned limits, and also from its outside covering being as necessary to it as the exterior cuticular covering is to any other part of the hoof or body; indeed more so, from its exposed situation to the road. Our only apprehensions in making this recommendation a general one, are, that in some cases the frog may get too much pressure, unless the shoe be thickened or turned up at the heels to accommodate it; nor need this, if thought objectionable, be long continued, as the frog will begin to waste and shrink soon after the shoeing commences, so as to remove the necessity of this measure; nor would this be at all necessary, but on account of a remarkable circumstance which takes place in shod feet, hitherto wholly unobserved, but which will be seen in the experiment hereafter to be related, *viz.*, that on the first application of the shoe to a natural foot, the frog falls and drops below its level; and this takes place, it would appear, from the operation of two causes; one is, that the weight of the horse pressing into the hoof, and its sides not being in a state to expand, being confined by the nails, a severer pressure inwards and downwards ensues, forcing the frog, and keeping it permanently below its level; and the other is, that the frog, elevated by the shoe, and not experiencing its usual support from the ground, cannot but remain in this state; but this first effect of the shoe only lasts, or has the appearance of lasting, for a time; for by the nature of this compression of the shoe, it occasions a general diminution by absorption of all

the posterior soft parts of the foot, and they adapt themselves in some degree to their new condition; so that, what with its diminution from cutting and pressure, and from the general absorption of the softer parts, it resumes in some degree its former elevated situation in the foot, where the thickness of the shoe is in general fully sufficient to prevent its being battered too much upon the road, so that I doubt if this rule may not be rendered absolute of not cutting away any part of the frog, unless some accident causes the discretional use of this hitherto incalculably-destructive procedure.*

Of its Exfoliations. As there are at times exfoliations of the horn of the frog taking place, and which, being observed, have been often supposed the natural means of riddance of its superfluous growth, but which we have already stated is performed by a more simple process; so our researches have led to different conclusions respecting these remarkable exfoliations. Indeed it is our wish to bring only that part of our studies before the public which have led us to different conclusions from the usual notions entertained of these things, as being the most useful sort of addition to the stock of knowledge we are already in possession of; which will account for the frequent claims we have made to novel views, or the discovery of new objects in this work: we wish that most of them may prove correct, and stand the test of that enquiry we could wish should take place about these objects, which cannot but be for the advantage of the public, by improving our knowledge concerning these useful animals, and in time will lead to their better treatment; for much abuse which they experience springs from the disappointment which expectations ignorantly founded, occasion.

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* Indeed to save these poor sufferers, we have published a single sheet on this subject for the use of Forges, price 6d., where these things are more fully described.

The exfoliations of the frog appear to be too irregular in their occurrence for a process that should belong to the necessary growth of a part, and seem in reality to be the attendant of some change of circumstances to which the frog is exposed: as for instance, if a horse that has been some time shod, and kept in a stable, be suddenly turned out to grass, the horn swelling and relaxing, a deep exfoliation will take place, and a succession of these exfoliations will follow each other, each being a longer time in forming than the preceding one, till at length it becomes suited to its new situation: if now the horse be brought back again to the stable, the relaxed horn so formed at grass will be thrown off, and a new succession of exfoliations be carried on, till again the part gets habituated to the circumstances of its situation, when they will cease to form, or only form in very long periods. This appears the habit of this part in this respect, which having stated, we leave for future more correct enquiry. We may remark that the blood vessels of the frog do not enter into its horn nearly so deep as they do in the sole and wall, and which may afford us some clue to the explanation of this phenomenon: and perhaps its very great elasticity and easy change of form are also contributing to this affection.

On Frog-pressure. Our next and last consideration regarding the œconomy of this part will be an enquiry into the probable degree of pressure nature designed it to receive. As on this important circumstance has been principally founded by some the hope of relief from the evils of shoeing, so I could wish to direct more particularly the attention of my brother professors in the veterinary art to this subject, and whether more has not been set down for this part to do than nature ever designed it should do, or than it has powers to perform, and which has been the great obstacle that has ever frustrated their views, and has proved a source of much cruel treatment to the animal. And I conceive I am entitled to as much confidence in giving an

opinion as any other professor in this art, from the various discoveries I have actually made in the structure of this organ; for it is lamentable to see how easy it is in a professor, professing an art he never understood, to fill the minds of unsuspecting youth with false impressions, which time nor better information can ever afterwards entirely remove: profession is indeed not always possession, as we but too often see; for all can profess, but all cannot acquire, where the path is attended with difficulty.—I now with diffidence, and after much reflection on the subject, lay before my readers what views I have arrived at respecting this remarkable part. And in undertaking to exhibit more correct views respecting it, shall at once grant the position that the frog will admit of pressure; but this concession must be immediately followed by the question or inquiry of the nature and degree of this pressure; on the ascertaining of which, the point of enquiry, or question at issue, can be only duly satisfied.

We may readily imagine that a part so exposed by nature to the ground will not be deficient in properties to bear its impulses, and will be provided with the means of neutralizing their effects: and so indeed it is, yielding like a sponge, and altering its shape to any impression of this sort; but when we come to talk of putting iron to it, and of giving it a primary bearing upon it, or by cutting away the inflexions, giving it a naked thrust against the ground, then we hesitate not to say such a degree of pressure was never designed it; and when added to this, that it was intended for a forcer of the inflexions, we are most completely at issue, and when the foot is shod in the usual way with nails through an inflexible ring of iron, embracing both sides of the foot, that men under such restraints it is to attack and overcome them, we say the proposition is most preposterous. Let us now consider why it is so, from an examination of the structure and relative position of the part.

That it evades forcible pressure in many ways, we have already seen; and to these we will now add various additional strong arguments, to show most fully the absurdity of such a doctrine. And in

doing this there will not be hardly anything so convincing to an enlightened mechanic or physiologist, as a due regard to the levels of all the parts of the underside of the foot; since they must inevitably lead us to just conclusions of the relative degrees of pressure that each part was destined to receive, and will proclaim more distinctly the secrets of the foot in respect to this faculty than any other. And in doing this, we shall first begin by noticing a most beautiful provision which adapts all the inferior parts of the foot to the various soils that they would in nature have to encounter, as, first, in the circumstance of a horse standing on very hard ground, such as a rock, or a paving of stone; we then see that the lower circle of the wall will alone come in contact with such a surface, being hard to hard; but if on yielding softer ground that is in degree broken, such as a gravel road, the wall will sink into it in a slight degree, and a second range of parts will become exposed to it, as the outer edges of the sole and the bars; and when again the foot should be exposed to perfectly soft ground, such as the natural sod, or a ploughed field, the wall will readily sink in, and the bars also and edges of the sole, and a third range of parts will then take a share in the bearing, viz., the cushion, and afterwards the more retiring base of the frog, giving soft parts to soft impressions, from which no harm can arise or inconvenience be felt. Now the pressure under the last circumstances must be doubly relieved and agreeable, in respect to mere feeling, from not only the softness of the medium, but by the vast multiplication of the points of bearing, and the impression will also be easiest to those parts which last receive it. So that there is a most beautiful provision made that these very soft and almost tender parts shall not be distressed by hard bodies. This single circumstance speaks volumes to an attentive observer, open to the language of nature.

If we turn our attention to the very nature and material of which the frog is composed, we shall find it no other than an inverted hollow arch of not very hard horn, that is, if it has not been abused and cut, and of nearly the consistence of Caoutchuc or elastic gum, incapable,

therefore, of much resistance, or of carrying much forcible pressure to the neighbouring parts, which are also of a harder nature than itself; that if it had really to operate such an effect upon them, it would be very much as the employing a wedge of dough to rend a block of wood, the absurdity of which does not require demonstration, and especially when such parts were confined on each side by an iron ring and nails. Let us also see the manner this arch of the frog is connected to the bars by its upper edges or margins, being the heels of this inverted arch, in which position it could produce little or no effect; and that the sides of the frog can produce none, the wide cavities of the commissures distinctly enough proclaim, that how any one capable of the least reflexion, when considering these parts, could for a moment, have so widely erred, in attaching such an office to it, is most extraordinary.* But the strongest evidence of all will be obtained by an actual admeasurement of the distance at which this part is made to retire in the perfectly natural foot, within the levels of the wall and of the other parts of its inferior surface; and having before us a cast in plaster of the very foot from which the engraving is made, we will proceed to measure these circumstances with as much accuracy as we are able; and since this foot had attained its fifth year without the least restraint from artificial measures, so it will be a fairer example to reason from than can at present be readily found; for the operation of the iron upon the natural foot is vastly more rapid than any one not having investigated this matter would believe, but of which we shall presently afford demonstrative proof.† And as it is from shod feet that hitherto ideas and reasonings on these matters have been formed; for it was

* Coleman is used, as we are credibly informed, artfully to tell his pupils, that if Mr. Clark *did but know* that fluids and soft bodies will resist, if confined, (that is hermetically,) as forcibly as solids, he would believe his doctrine. The position in itself, as a general maxim, may be true, but in no way unfortunately does it apply to the case, as all confinement of the frog is out of the question, it having a most guarded and ample space around it, and the more it descends from pressure above, the more freedom and open space it obtains below.

† Casts in Plaster of Paris, from the very model, may be had of the Author, or of E. Limebeer, the bookseller, Giltspur Street, with a box, price 2s. 6d.

naturally apprehended that as soon as the shoe was off the foot, the foot was again in a state of nature, that is, if it had a sound, and tolerable appearance to the eye; for the eye also soon gets used to deformity, and does not discover it. And this error it was in taking the shod foot for a natural one that embarrassed and misled me in all my first experiments, on what I conceived to be the natural foot, during several years, and completely obscured my views of the true nature of these things, and my predecessors also, as the general tenor of their works will sufficiently indicate. For the foot shod even only twelve months is more changed than any one, unapprized, would believe. Quitting, however, these remarks, we proceed to an examination of the actual state of the frog in the natural foot, for another full grown natural foot we are not likely soon to see again; as this can only be done by a horse kept expressly for the purpose. And any one who is so disposed, has the power to follow us by so doing, and to detect any error if we have mis-stated any circumstance, which we shall not at any rate intentionally do.

This model, or plaster cast of the foot, being turned downwards upon its proper bearings on a flat level table, gives an elevation of the frog above the bearing surface of the wall, as nearly as I can measure it, of about three eighths of an inch in the very lowest part of the frog, which is found to be the margin, or lips of the cleft.—Where the frog meets, and embraces the Inflexions, half an inch is the height; and at the very extremity of the base of the frog, the elevation is full one inch above the level of the table. Now the retirement and distance of this member within the other parts of the hoof forcibly leads us to conclude, that it was not by any means designed for that considerable degree of pressure that has been apprehended; and this, together with the softness of its horn, compared with the horn of the other parts of the foot, and the almost, we could have said, adventitious nature of the part, as from its non-appearance in the young foal, to be shewn hereafter, would altogether perfectly decide our opinion in this respect. A section, exhibiting these different levels in the foot, is seen in plate 2, fig. 7.

Nor can we omit to mention another circumstance, which appears to come in strong confirmation of these ideas respecting the frog; which is a passage in the most ancient of all authors on the subject of horses. The venerable Xenophon wrote several hundred years before the art of nail-shoeing was had recourse to, and he remarks, in his advice respecting the selection of a horse, "that the lofty foot is to be preferred, as in it the frog is raised high above the ground;" and he further compares those horses whose frogs or soft parts come to the ground, to "cripples among men, who are wont to go on parts nature never designed they should;"* or, as he observes, go equally on the weak as on the strong parts. The above particular advice appears to point out two very curious circumstances: first, that they did not shoe, for that would have raised the frog high enough, and higher than was necessary, and made the recommendation useless; and secondly, by their use of the foot in the natural state, they found by experience that, if the frog was low, by its battering against the ground it was subject to become tender; hence the preference given to the high-placed frog. After the same manner do the veterinarians of the second and third centuries, who were employed in the Roman armies of the Eastern Empire, also recommend the choice of a horse's foot; but emphatically add "small" to "an elevated frog,"† as it must, no doubt, be not so subject in consequence to become tender, from being less soft, as well as less exposed to the road.

I have, however, observed in young feet, that is, at two or three years old, that the frogs are on a lower level, in respect to the other parts of the foot, than at a more advanced age. As all the parts of

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* Οἱ γὰρ παχεῖς πολὺ τῶν λεπτῶν διαφέρουσιν εις εὐποδίαν. ἔπειτα οὐδὲ τοῦτο δεῖ λανθάνειν, πότερον αἱ ὁπλαί εἰσιν ὑψηλαὶ ἢ ταπειναί, καὶ ἔμπροσθεν, καὶ ὄπισθεν, ἢ χαμηλαί. αἱ μὲν γὰρ ὑψηλαὶ πόῤῥω ἀπὸ τοῦ δαπέδου ἔχουσι τὸν χελίδονα καλουμένην, αἱ δὲ ταπειναὶ ὁμοίως βαίνουσι τῷ τε ἰσχυροτάτῳ, καὶ τῷ μαλακωτάτῳ τοῦ ποδὸς, ὥσπερ οἱ βλαισοὶ τῶν ἀνθρώπων.—ΠΕΡΙ ΙΠΠΙΚΗΣ, Ed. Leunc. p. 932.

† Χελιδόνα δὲ μικρὰν ἔχοντες εὔποδες καὶ ἀγαθοί.—*Apsyrtus apud Scrip. Græc. Vet.* p. 252.
Οἱ συμφυεῖς κάτωθεν καὶ χελιδόνας μικρὰς ἔχοντες.—*Ibid.*, p. 253.

the foot, especially of the posterior parts, are then in a very supple state, and may receive from the frog that pressure that will in a degree assist to unfold and open them to the extent nature requires, in which the bars will also co-operate with the frog and inflexions. This purpose effected, and the growth and strength of the foot completed, the frog we find assumes a higher station, more out of the reach of too much battering upon the ground. The frog of my bay colt, (Heathfield) at two years old, was soft and puffy, and swollen in the middle, and without much feature, and the frog-stay with a chop or slit longitudinally extending beyond the proper limits of the cleft; and the margins were beginning to appear, but shapeless as yet, so that out of this soft mass the frog forms itself, and at length becoming harder, and condensing in volume, it receives its sharpness and features. See Pl. 6.

At five years old exactly, and in the month of May, my chesnut mare, after two or three exfoliations in quick succession, had the frog suddenly become very pointed, and the body of the frog also became diminished and harder, and its sides impressed or bent in, giving it a handsome sharp feature, and an efficient appearance for service. So that it is not till five, this organ obtains its proper appearance. This I mention, lest a casual view of the frog in a young horse might lead the reader to suspect the above statement not to be correct.

It appears also, in fact, that it is not so much from the upward pressure against the frog, as from the downward pressure of the limb and weight of the body upon the bones of the foot, that should produce this effect of expansion upon the yielding contents of the hoof: timely assisted, and in due time prevented, from too much depression in this direction, by meeting with the support of the frog, then brought to the ground at the time the strain and weight is greatest: the sides of the foot then expanding laterally through their whole extent, and springing back again to their places on the removal of the exertion and weight. And they must, in any violent exertion, as in galloping, &c., where the force is tenfold that of the mere weight, make these parts, if at liberty, play, or expand to an extent, that

merely considering the hoof in the hand can give us but a faint conception of.

It is therefore most clear to me, that the frog of the horse is no wedge for forcing the foot, but is given to fill up the chasm of the inflexions, and to adapt it to all kinds of weights or impressions, and to permit the change of form necessary to the foot, to guarantee it also from the fatigue which a too solid resistance would have rendered it liable to, and to preserve the animal from the concussion and reaction he would have experienced without it. So that the revival of this old French nonsense of Lafosse by our college has done more harm than it has ever done good, and by adding to it other follies and abominable cruelties when the doctrine was not found to succeed, instead of abandoning it, was certainly highly reprehensible.

Indeed, after a consideration of all the circumstances, our conclusions would be, that the frog is not designed by nature for much pressure, and that only at intervals, when under strong exertion to relieve the other parts, or against soft ground to partake in the general bearing.

As we have been witness at times to the horrible suffering of this animal from these most absurd doctrines, so we hope, after so clear an exposure of their error, we shall hear no more of his being thus tormented which would indeed be little less than criminal ignorance and scandalous barbarity.

Composition of the Frog. Its horn is quite peculiar, being but little organized, and perhaps without the pores of perspiration, such as the wall and sole have, it is indeed more like dense elastic gum than horn, and which probably is the cause of those large masses or coats of exfoliation, from its not having the power of ridding itself under great change of circumstances in smaller portions, these being in their commencement of the full depth of the frog. Its growth seems very much independent of the growth of the other parts of the hoof, and it is much more slow even in health, and still more so when coerced, cut, weakened, contracted, and diseased.

By more careful observation, I since have found that the frog does not exfoliate in branny scales, as I imagined formerly, but in real thin

layers of horn which become dry, and detach themselves: their presence is a defence, nor can they do the smallest harm that should render it necessary to use the knife; for the road will amply perform all necessary removal.

On the names of the Frog.—In concluding this account of the frog of the horse, it may be matter of curiosity to some of my readers, to know the various appellations this singular part has obtained with different nations. The French call it ***La Fourchette,*** or the fork; the Latins called it ***Furca;*** and once only in Vegetius we find the term "***Pendiginem***" applied to this part, apparently from its hanging down, or being suspended from the roofing of the sole of the hoof, as it might appear to them. The Greeks termed it χελιδων, or the swallow, having a distant resemblance to the oval pointed body of that bird: or, which is more probable, from its forked tail, the two halves of the base of the frog dividing into two portions somewhat of this resemblance. It ever occurs, however, with them, in the plural, χελιδονα.

We had formerly apprehended that the word frog was wholly an English designation; but we have since observed that the same name, in the very same sense we now employ it, occurs with the Greek veterinarians of the lower empire, who have called it βατρακον, or ***frog***, as we now do. ***Needham's Geoponicorum,*** l. xvi. ***Argumentum Absyrti,*** p. 417. It may, however, be a corruption of the text; and this I am the more disposed to believe, from the collator being an Englishman, and still more so from the writings of Absyrtus, which are many, in the ***Scriptores rei Veterinariæ,*** having no such word, he always using the epithet χελιδων, as we see in a former page.

Vegetius, the most elegant of the Roman writers on these subjects has called this part ***ramula,*** lib. 1, cap. 56, ed. Manheimii, p. 80, which is perhaps a corruption, or technical, for ***rimula,*** derived probably from ***rima,*** the cleft or chink of the foot, ***Ranula*** does also occur in Vegetius, and is probably nothing but a corruption of the above, lib. 2, cap. 58. ***Ranulæ,*** with Vegetius, were evidently the blains or boils on the lips

of oxen, lib. 3, cap. 3, ed. cit. p. 169. It is evident indeed that such a term as *rana*, *ranula*, or *frog*, applied to this part of the horse's foot, unless to an Englishman, would be quite unintelligible.

The extraordinary origin of the term *running Thrush*, deducible by legitimate steps from the Latin word *Furca*, which we have traced satisfactorily, will be found, we apprehend, amusing enough: *Furca*, in French *Fourche*, and its diminutive *Fourchette;* this contracted became the *running Fourche;* and from thence we find about the days of queen Elizabeth, as in *Blundville*, and other writers of this period, *running Frush;* and subsequently in James's reign, and after this period, on the establishment of horse races, and the prevailing influence of the jockeys, who, not finding in their vocabulary of English words such a one as *Frush*, declared it must mean a *Thrush*, and a *running Thrush* it has ever since been called by the whole kingdom, though the running blackbird would have been almost as appropriate.

A considerable obscurity also prevails as to the origin of the term *frog*, applied in England to this member of the horse's foot; and we once were led to conjecture that it might possibly have been obtained from the Roman *furca*, as the transitions from *furca* to *furc*, *froc*, and *frog*, were not difficult. But we are now led to believe, from maturer consideration, that it is of a much more recent date; for in reality this appellation does not extend much further back than a century, and we confidently believe it to have had its origin in the manner following.

The oldest of our English writers followed the French in calling this part *Frush*, being but a slight remove from their *fourche*, as we see in Blundeville, De Grey, and others, and which prevailed to the time of the Commonwealth, or the restoration of the Stuarts, by whom were instituted horse-races, and which led to a more extensive use of the horse, and, in some respects, to a more refined consideration of him, in order to success in these races. And the painful tenderness of a frog, labouring under an ulceration and discharge

from the cleft, became more an object of regard, as also from its increased frequency from the habits of using shoes, and of the shoeing smiths in cutting the part; so it received very naturally the name of the *running frush*, which meant no more at first than the *running* or *discharging frog*. The word frush, however, being strange to these men, soon became converted into thrush, being exclusively applied, and technically used for the disorder only, and became absorbed in the diseased part; this next created a necessity for writers subsequently, or the men themselves, to invent some other name for the entire organ; and it was about the time of Gibson, or of Markham, one of his predecessors, that they first took to calling this part the *frog*, which absurd term has been ever since continued in this country, but is wholly unknown to any other: such appears to be the true steps of the explanation of this affair: and to which I may add also, that in my opinion the sooner the term is abandoned again the better, to which so many morbid notions attach, and to employ in its stead the ancient term *furca*, *furc*, or *furch*, as may be thought preferable; the latter we prefer as being more strong and distinctive.*

We could however desire forcibly to recommend to those who wish to write intelligibly or elegantly on these subjects in treating of the frog, or its qualities or relations, to recur again as much as possible to the original Latin epithet *furca*, since *rana*, *ranula*, or *ranine*, can never apply but to the animal itself. The following may serve as examples of this use. *Furcaceous* weakness is difficult to be overcome. The *furcaceous* structure in the foot is peculiar to the horse tribe, though *furcaceous* rudiments exist with the feet of many families of quadrupeds. *Furcaceous* debility and tenderness ever follow its being hacked by the knives of the smiths, &c. Indeed this would be greatly to the advantage of the science; and in removing

* The French translator laughed when I told him we called it *la grenouille;* and I acknowledge I felt also somewhat ashamed of the taste of my countrymen; but when he was compelled to use *merle courant* to translate running thrush, he became perfectly convulsed.

the silly term *frog* from the horse's foot, we shall only remove a misnomer and barbarism of the first order, the use of which will be ever attended with confusion and ambiguity; and by restoring again the ancient term *furch*, we enrich the English language, and add to its copiousness, by a useful and expressive term well suited to the subject, and for a distinct object that never can again be confounded with any other. We may also use *running furch* for the discharging frog without any confusion; or we may, which perhaps may be still better, retain the word *frush* exclusively for the disorder; either way, however, no confusion can arise whichever of these terms we choose to employ.

We now conclude our description of the external *furch*, leaving the highly curious structure of the internal *furch* to be given with the attaching parts. And for some further particulars of the growth of the furch, and cure of the frush, we must refer the reader to our Treatise on Running Frush. London. 1821. 2d edit.

Of the Sole.

We have thought it advantageous to describe the above two important members of the hoof, the wall and the frog, together, or in succession, as conveying to the mind a more lively and combined notion of their mutual actions and relations; so we now proceed to consider the third and last member composing the hoof, viz. *the Sole:* for in reality there are no more than three full parts to form the hoof, though they may be divided into five for minutely examining them; for in fact the two inflexions are but parts of the wall, and the furcaceous extension round the upper part of the hoof forming the band, may be considered as one with the frog; the sole is therefore making the third member of the hoof. For its appearance when detached, the reader may consult pl. 2, fig. 3; and in combination with the other parts, pl. 1, or frontispiece.

This part may be described as an irregular thick plate of horn,

given to fill up the great inferior opening of the wall, and may be said to consist of two oval pieces united in front, but widely separated and diverging posteriorly, and presenting to the ground a concave or arched figure, more or less flat. This arch is not however the portion of the inside of a regular sphere, but is very irregular, having a waving or undulating appearance from the centre to the circumference; its central parts are also more cupped, and thinner in horn where its motion is more demanded; but in passing upon the inflections, it suddenly spreads itself, and taking a direction upwards, presents a broad surface of attachment to these parts. Its outer margin in approaching the wall declines, then rising again it dilates to a broad surface for adherence to the inside of this part, mixing with the keraphylla. We may perhaps afford a more familiar notion of its general figure, by comparing it to the mouth of a bell extremely extended or flattened. In the hind foot, the sole is not in general so wide and spreading as in the fore foot, but is deeper, and more arched or cupped, nor is it so elastic or yielding, being in conformity with the propelling system of this organ. For we may denote the one limb by the term *propeller*, and the other by the term *sustainer*, or sustaining limb.

Nature has secured herself most remarkably in two ways, from the effects which an arch of common properties would have been liable to, in becoming more condensed under pressure, and forcibly resisting the load brought upon it, which would have been subversive of the leading principles in the mechanism of the hoof—the sole therefore is cleft to its centre, or even beyond it, by a large triangular opening formed at its posterior part, which destroying the resistance of the arch, serves to receive first the inflected ends of the wall of the hoof, and then is closed and filled up by the insertion of the inverted arch of the frog; so that these ends of the hoof are thus tied in, and secured from being forced asunder by the pressure from within, being thus wedged in between the frog and the sole, and are made to serve outwardly in their places the other offices we have already noticed,

and the sole, by the above chasm in its centre, being thus effectually broken, has a diminished resistance in all its parts.

Again: the lower circumference of this arch of the sole, which may be considered in the light of the heels of the arch, is every where abutting against the sides of the wall, which, as we have formerly shown, are rendered yielding to its impression against them, and the sides of the frog dilating, (which retracts and shortens this part,) affords full opportunity for the extension, and which is necessarily accompanied with a descent and flattening of the sole, in which action all parts of the hoof combine, and in this manner, we maintain, is performed the elastic movement of the hoof, and which we apprehend to be essential to its well-being and healthy existence.

Now the shoe being perfectly inflexible, wherever nailed, will fix the parts of the wall more or less, and resist its action; the weight then falling on the sole, it must depend (the sides of the hoof being fixed) upon the fissure inclosing the frog for its relief and yielding, which collapsing will cause, as we have before stated, the frog to be compressed and to descend from its natural situation, and the bars to approximate, and contraction and disorder ensue: the sole, also, by this confinement, having less action, is daily thickening and losing its natural powers of motion, and of throwing off in flakes the superfluous growth; sometimes, also, if the nails are brought very close, or the shoe be made too small, and the hoof be not of the strongest order, the arch of the sole is forcibly thrown upwards against the coffin bone, and creates the greatest uneasiness and lameness, which is blindly attributed often to standing in the stable, which may assist the mischief by its dryness and heat, but cannot alone operate any such effects.

The texture of the horn of the Sole is vastly more soft and friable than the wall, and more elastic and spongy, which must usefully cause any blows upon it from stones of the road to be more obtusely felt. It soon loses its coherence, and falls away in dead scales and flakes, by which its concavity and elasticity is preserved. In the

acute founder from sudden chills, it is subject to be detached, forced downwards, and reversed into a convex form, with cruel suffering, by the fluids extravasated from the ruptured vessels. In chronic founder, also, it is liable to be rendered flat, or sometimes convex, by the more slow process of descent of the bones of the foot, forming a rounded cavity in its upper surface for their lodgment. Its circumference is but too often infringed upon by the nails of the smiths, and its extreme points squeezed between the inflected horn of the wall, or bruised by exposure to the naked iron of the shoe, being bereft of its natural protectors, the nodes of the inflexions.

Its Secretion is from the membranous sole, and the vessels passing through its horn are not perpendicular to its general surface, but advancing obliquely forward in the direction of the axis of the hoof. They are short, and freely permit the perspiration.

From the view we have taken of the horse's wall and sole, it will be seen how imperfectly the ancient phrases *Solidungula* and *Solipes*, &c. would serve to convey a true notion of the structure of this kind of hoof; for though the front be solid, the posterior parts possess the greatest degree of elasticity, short of being actually cloven, that can be imagined, from the sole being cleft and opened to its centre, and being then filled up by an elastic frog. In such a covering as a *Solidungula* would seem to imply, or a continued circle of horn, no animal could long stand, much less move, without great pain from jamming and compression, which would soon become destructive.

If it were necessary to make use of a single epithet or phrase for this sort of foot, the term *Semifissipes*, or half-cloven foot, would be less objectionable, though also not exactly true, on account of the presence of the frog, which renders the foot in one sense entire again, and appears to afford the most essential character of this kind of foot, added to the entire hoof in front.

But the epithet *Monuchal*, after the Greeks, from μονος, one, and ονυξ, hoof, is certainly by far the best expression for this order of feet, as not implying solidity, but only that the hoof is single and undivided.

Now the horse's hoof being formed of one entire piece, is perhaps the most considerable single mass of horn any where to be found among animals' feet for their defence, so is it also in its plan the most simple and efficient for a fleet animal, and in the details of its internal furniture, perhaps the most richly and curiously organized and embellished of any quadruped.*

Having now concluded our view of the full-grown hoof we pass to the fœtal hoof, and to the attaching parts; but before entering upon these, we shall in this place, as the best suited for it, introduce a few remarks on the word *heels*, when applied to the horse.

On the confusion arising from the use of the word Heels when applied to the foot of the Horse.

As the term heels, when applied to the horse's foot, really means nothing, or only that it is one of the posterior parts of the foot or leg, and is much too vague even for general use, how much less then is it fitted for the purposes of science, that we could wish to lay before our readers our reasons for proposing its disuse altogether, at least amongst the profession.

The bulbs of elastic horn at the back of the frog being the most posterior parts of the foot, would therefore first claim to be called heels, if any such parts really existed. The two inflexional columns

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* Whilst the present sheet was going to press, my nephew, Charles Clark, accidentally turning over the leaves of old De Gray's book, found a passage which serves strongly to confirm my conjecture of the origin of this barbarous appellation *frog*, applied to the horse's foot; and this passage also seems to point out that it was first used by the country smiths: it is as follows—"*How do you cure a Running Frush?*" Ans. "This is a naughty sorance which I have heard rurall smiths to call the frog, by reason that it breedeth in that spungy part of the heel *that they* call the Frog."—De Gray, p. 213, 1st ed., 1639. So that it began with the *rurall* smiths, as he quaintly terms them, and probably had not then reached the metropolis.

below these bulbs are more frequently termed heels, and as often is the extreme point of the sole; for when these parts get bruised by the shoe, it is said "his heels are bruised;" and to lay the shoe upon the heels, is to lay it upon the inflexural angle or node there formed: again, if the horse be chapped in the bend above the foot, he is said to be greasy heeled; and if the fetlock is chapped, he is also greasy heeled; and if the cracks should be near the hock at the back part of the shank, he is again also said to be greasy heeled.

Now this confusion arises from there being no part in the structure of the horse's foot that has any resemblance or correspondence whatever to the human *talus*, or heel. The posterior extremity of the *os calcis* forms the true human heel, and is brought to the ground; and this bone in the horse is consequently found in the hock, and occurs only in the hind extremity, and so far removed from the ground, that it would be laughably ridiculous to call it in the same sense we use that term, the heel, not having either its situation or offices. And as what we call heels in the foot of the horse have no corresponding structure in the human; so it would be forcing an analogy between parts where there can be none to use the same phrase for them, and by so acting, to create a perpetual disorder and confusion of ideas.

It would be advantageous to that precision, which an art like this demands, to remove the term heels entirely from it, as we can as well, or much better, do without it, and substitute new expressions for all the parts that have been so miserably miscalled. It is true the term *horny heels*, and *fleshy heels*, might certainly be used as to inside and outside; but as the inflexions are nothing like a human heel, nor their contents by any means fleshy, that is, muscular, so in every way we get into difficulties by their use, and shall assuredly find it best to avoid such terms. Nor will it be necessary for us here to enumerate all the names of these respective parts in the horse's foot, since we have already done this in describing them, and every where purposely omitting the term heels, in order to avoid its embarrassment,

and to show its perfect uselessness. It appears to be almost necessary before any reform or great changes can be carried into effect in any art, to expose and remove as much as may be the ignorant language, and cant phraseology which supports it.

Some remarks on the fœtal foot, and colt's foot, at birth, and the half-grown foot.

It is somewhat singular, and worthy of observation, that these parts which form so considerable a share of the foot of the full-grown horse, have scarcely an existence in the young foal, their rudiments or germs only are seen at this period of his life; for the wall of the hoof is then lapped about the coffin bone in such a manner as nearly to meet at the back of the foot, and is of a form more obviously cylindrical than in the adult foot, and proportionally longer; and what is remarkable, the upper parts of the hoof at the coronet are larger than the base or bottom of the foot: see the annexed figures, pl. v. fig. 1 & 2.

The first-formed horn, whilst the foot is in the womb, is yellow, and appears almost gelatinous, as at *b*, fig. 1. The upper part, however, and half way down, is already succeeded by black horn, *a a*, and *c* is a sunken or impressed division between them. But what is most remarkable, and hitherto unobserved, we believe, is, that the bulbs of the frog, *e*, are extended into two oblong members forming *ligulæ*, or straps, which pass over the angle of the inflexions, and extend along the sole to a considerable distance, and are terminated by regular points, or rounded extremities: these are soon worn away, leaving the ragged fringes of the bulbs as seen in the adult hoof, and which imperfection is inexplicable without this curious fact being known. At this period, the filaments of which the horn of the wall is composed are separable by maceration; and I think it probable, that in the first months of gestation, the wall is formed of three

FOALS FOOT *a few weeks before birth.*

a.a. Black horny hoof. b. yellow gelatinous termination of ditto. c. a depressed line of division between them. d. the Frog. ee. Bulbs of the frog band prodigiously lengthened.

FOALS FOOT AT BIRTH.

distinct pieces, the two inflexions having a separate existence; but before the time of birth they appear to be firmly united, and in the adult hoof, form one perfectly inseparable mass.

The frog has in reality no existence in this fœtal foot, but its point is represented by a singular oblong claviform piece of horn lying between, and defended by the straps of the bulbs. The margins of the wall are seen perfectly well defined inside and out, and its point or pince is contracted, and pointed like the beak of a bird. The sole is only a little thicker than a very stout ordinary membrane. At birth, or soon after, the frog makes the appearance of a lax membrane lying between the inflexions, as it is represented in fig.2, where it is perhaps a little forced out by the drying of the foot in the preparation; and this germ of the frog gradually extends itself like the unfolding of the rose-bud, and furnishes till it attains its full dimensions,—and its full figure is not accomplished till about the fifth year, or later, as the other parts of the body also do not in a general way acquire their full dimensions and strength till about the eighth year.

As his size and weight increases, these parts we are describing, together with the frog, are brought more to the ground; and these germs, or rudiments of the foot of the foal, are, by the pressure and the growth, slowly unfolded. Nor, may we observe, do their feet ever obtain their entire growth, if restraint of any sort has been used during this period.

And it is also remarkable, that in the young foal, the front of the foot singly performs all its offices; with his limbs held almost straight and erect, and his fetlocks very little bent by the weight, he accompanies his dam, his toes, as it were, digging at every step into the ground. His body at this period is singularly small and light, whilst his limbs are extraordinarily developed, in a disproportionate degree to his body; and he performs his merry gambols, dancing round her with a suppleness and grace that reminds one of some spright or ærial being, nor is he at all suspicious of the whips and thongs and iron measures that are so soon to be his portion.

Of the half-grown foot. In tracing the progress of the horse's foot to its maturity, we have to notice the half-grown foot, the figure of one at two years and a half old, taken from my waxy colt, one of Lord Heathfield's stock, sold after his lordship's decease, and admirably sketched by my friend Sydenham Edwards, is seen in plate 6. The general ragged appearance of all parts is first noticeable, and especially a singular formation or disposition of the inflexions, which are spreading over the tenderer parts of the sole, as though to protect it, and deaden sensation. This foot was a little inclined to flatness, which rendered this aid, perhaps, the more necessary. I never remember, however, to have seen it in any other foot so strongly marked, though with feet of this order it may not be, perhaps, an unfrequent circumstance: *a* is the inside quarter, and *b* the outer quarter, or side.

The unfinished form, and irregular make of the frog, and especially of the frog-stay, is particularly noticeable in this young foot, for the frog-stay is the last part formed, and is completed at very different periods in different subjects, and requiring often our address and attention to ward off a running frush, which may create a tenderness for life, and in weak feet requires real skill and assiduity to prevent it: see our *Treatise on the cause and cure of Frush*, 1821.

The fore shortening of the inflexions in this foot is made out very distinctly, and the difference of the two inflexions, or rather modes of their inflexion, are very conspicuous, and the two bulbs are also dissimilar in size, the inner one being sensibly the largest.

The wall has a conspicuous dark line in the middle of its thickness, which seems to indicate a division into the two tables we formerly mentioned in its description. The cushion of the frog has not as yet any visible existence.

Often at this early age, and even earlier than this, without being aware of its consequences, perhaps, is the foot of this ill-fated animal bound round with a wretched bar of iron, called a shoe, producing the most deplorable effects, not only arresting the proper growth and

The half grown Foot or at 2½ years old, ragged and not as yet fully develloped.

unfolding of the parts, but occasioning also a diminution from its present state; and some Welsh-bred horses in particular I have seen, at four years old, perfectly ruined in their feet, through greediness to have their utmost labour, and ignorance of its effects, often ironing their horses at one year old, and making them to slave with coals, wood, &c.

We now conclude our description of the horse's hoof with observing, that in respect to the ass and the mule, the same general principles of construction also pervade their feet; the form, however, and the proportions of their respective parts widely differ, of which we shall take a very cursory view.

The ass's foot to the eye of the spectator, viewing it on the ground, appears of an oblong figure, and very flat-sided, no way like the more noble hoof of the horse; and if we turn it sole upwards, it presents an oval, whose broad end is the pince, and whose narrower termination posteriorly is of a somewhat square form, with the furch pushed out beyond the inflexions, and with the bulbs forming not two rounded, but two pear-shaped masses, the narrow ends of which pass off to form the furch-band. It is also to be remarked in these asses' feet, that the thin posterior sharp edges of the inflexions are in them much more blunt and rounded, and which, by the obliquity of the bearing of the hoof on the ground, are brought to some extent in contact with it, for the hoof itself appears to be more inclining to the horizon than the horse's, so as to give an angle of 45 instead of 33 degrees in its slope in front, which, we may remark, will occasion a less rapid detrition of the pince; this, together with the wall of the hoof being disproportionately thick in its front parts, must have particularly strengthened it for wear, and have suited his labours for the early ages of the world before shoes or defences of any kind were known. About opposite to the nodes of inflection, there is in the wall a very perceptible and singular indentation or constriction of the horn externally, after which it again somewhat dilates to give room to the body of the furch. The horn of the ass's foot appears

of a more sordid description than the horse's, and the wall is very often ribbed and wrinkled, making altogether a meaner appearance in conformity with the animal himself when compared with his more noble relative. The cruelties still inflicted on this inoffensive animal, in return for his useful services, are most revolting, and custom has too much reconciled them to us properly to feel their enormity; and carried to such lengths are they often, that they answer no purpose by losing all effect.

The Zebra, the Quagga, and the Cape horses, have feet between the horse and the ass: in these the foot posteriorly makes a sort of irregular square; and the two inflections cross the foot to a sudden concurrence, which very much shortens the furcaceous parts, and lengthens the front or entire part of the sole—the bones and interior matters of their feet are very much simplified and diminished when compared with those of the horse, nor are the elastic parts nearly so much developed, nature not requiring in these inferior animals those parts which were indispensable to the perfect accomplishment of the grandeur of form and graceful action of his nobler fellow slave. And we are led to anticipate with joyful feelings the days, perhaps not distant, when he shall be well understood, and his proper uses be called forth, and when he shall be an object of delight and profit to all, instead of the ignorance, violence, and cruelty, which at present prevail in his use, and often with such unfeeling extortion, that they defeat their own purposes by his perpetual destruction; so that though really coining for them an immensity of money, the general account is a loss. I have watched the end of the most extensive post-masters, and have observed with nearly all of them, that though they pursued the most reprehensibly-cruel measures to obtain their utmost work, they in the end were impoverished and bankrupted I could name a half score of these who had, when they began, been deemed rich men. The Almighty seems indeed so to have ordained and framed it, that he who shall offend against nature, it shall not be to his advantage. The slave trade can also exhibit a very similar

account, but its enormities, bad as they are, are as nothing to the ironings, bittings, gaggings, strappings, and scourgings of these most inoffensive and worthy creatures.

DIV. 2.—OF THE ATTACHING PARTS.

After a Foot has been macerated a few days in water, it may be drawn forth from the hoof, and we are then presented with a view of the interior foot, some of whose surfaces are chiefly for attachment, others for attachment, but chiefly secretion. I first describe——

*The Cutidura,** the uppermost of these, which is prominent and rounded, being in reality a prolongation or extension of the skin indurated and enlarged, in order to fill the cutigeral concavity of the hoof. This part has hitherto been strangely taken for a ligament, though without possessing a single trait of this description of parts, but is itself actually held in its position by other ties or attachments, such as the perioplic band and keraphylla, aided by the hollow cavity in the top of the hoof, and the numerous vessels which enter it.

The cutidura appears intended for conveying into the coronary concave of the hoof the organ for the immediate secretion of the wall; and we find it, in fact, composed of two very different parts or structures, the innermost of these being a dense white cartilaginous cushion, and which acts as a bolster in supporting the membrane above it: this cartilaginous part is but little vascular in itself, but is much perforated for the admission of blood-vessels through it, which on emerging, suddenly radiate into the membrane above. This superimposed membrane is red and highly vascular, and in thickness appears to be about the sixteenth of an inch; it is rough on its exterior surface, which fits it to the concave ring of the wall, of which it is

* From *Cutis*, skin, and *dura*, hard.

doubtless the immediate secreting organ. From this membrane, or perhaps passing through it, arise the long filamentous vessels which enter the hoof for maintaining its succulence, and for the purposes of transpiration.

We have also, we think, observed that this red membrane does not appear to terminate with the cutidura, but has a continued course downwards, and is reflected over every leaf of the Podophylla, and advancing further, becomes likewise the genetrix, and secreting organ of the horny sole. We suppose it to be formed of the superficial part of the skin, that is, that part which is exposed when the cuticle is removed; and by being rendered extremely vascular, it becomes fitted for its very important office. And the cartilaginous portion of the cutidura, which we have described above, is perhaps merely a continuation of the inner, harder, and more cartilaginous part of the skin; and the *reticulum* again is formed of the interior of the skin, or of the cellular membrane lining it. And if such be the case, the whole arrangement is a remarkable example of the simplicity and œconomy of the provisions of nature, in giving at pleasure to simple parts new structure, new offices, and new powers, which cannot but obtain our high admiration, as the providing for wants so important by means so simple; for what appears to be most singular is, that the same parts or materials as are found in this wonderful structure of the foot, actually exist in the parts above the hoof, that there is no new creation, as we have just seen, and to which may be added that of the frog-band and the hoof—the one is but a vast amplification of the cuticle, and the other an extraordinary amassment of the hair.

In the upper part of the cutidura is seen the remarkable groove, or notch, so inviting to the knives of former anatomists. And in order to understand fully the intentions and uses of this part, we must again advert to the furch-band, and we believe it is for the first time it has ever been so treated of. If we examine with care and attention the upper margin of this band in a dried specimen, we shall probably discover a double edge, or two distinct terminations of it,

with a small channel between them: this appearance we had often noticed, but could not at all render any account of till lately. In fact the lowermost, or innermost of these terminating edges, which is also the thickest, actually occupies the above channel or notch in the cutidura, and is firmly held there. Now from this strong point of its attachment, or insertion, it sends off a slip or process of soft horn, which is reflected over the skin above, and which becoming thinner as it advances, soon terminates in meeting the cuticle, and making common surface with it. This slip, or little process of soft horn, is not more than about the eighth of an inch in width, and in drying after removal, very much contracts, and the two edges curling towards each other internally, give the above-described appearance of a channel between the two edges. An inverted comma of the printer's would afford not a very indifferent representation of this small part, seen in section, the thicker part of the comma representing the horn which is lodged in the notch, and the finer tail of the comma the reflected portion upon the skin. Now this reflected slip, when fresh, may be about, or perhaps rather more than the eighth of an inch in width, and its breadth determines the actual thickness of the band. This slip adheres very strongly to the skin in the recent hoof, and requires considerable force to detach it. It seems, after this description, almost superfluous to add, that the concave side of the comma is affixed to the skin, and the convex side to the horn of the band. The cutidure becomes flatter and wider as it passes posteriorly, and is finally lost in mixing with the dense membranes of the sole, and those which form the horny inflexions.

Of the Podophylla. The extensive sloping surface below the above part is presenting an almost innumerable assemblage of flaccid foliations or leaves, or processes, which serve to hold the hoof to the foot. They correspond in number to the foliations of the kerophylla, between which they are inserted; they are very limber, and easily fall together on their separation from them, and by their appearance and feel, and the smell they emit when burnt, are probably

of a cartilaginous nature, which is also confirmed in that they are sometimes found, from restraints of the foot by shoeing, to be ossified. That they are really cartilaginous, we have also proved in another way; for if we expose them to the heat of boiling water, they are reduced to a thin gelatinous mass, losing entirely their figure, and even the heat of a dunghill is sufficient for this, whilst the keraphylla do not at all alter their form by this proceeding. And I have seen in canker cases, on dissection after death, that where the podophylla had been destroyed, a smooth plate of cartilage supplied their place, which to me at that time was quite incomprehensible. They clearly appear to me to be a continuation, or production of the cartilaginous part of the cutidura; and I am also of opinion, that they are enveloped on every side by a continuation of the red portion of the cutidura, which gives them the rounded edges and smooth vascular appearance they possess, and which seems to be confirmed by the circumstance that horn is readily produced in all parts of the foot below the cutidura, in cases of accidental injury, or of exposure of these parts. They probably secrete the keraphylla, and are not placed on the periosteum, or bone, but on a thick membrane, or *reticulum*, hereafter to be described; they extend also upon the surface of the cartilages.

Of the Membranous, and secreting Sole. A dense web, and from its similar vascularity probably allied to the reticulum above mentioned, supports, or conveys, the immediate secreting organ to the upper surface of the horny sole; its vessels are highly beautiful when injected, and appear reticulated in squares and areas of almost all figures; and by their fluid contents can yield to all impressions without any arrestation of the blood's circulation. Round its circumference runs a vein and artery, which are sometimes opened in inflammation of the feet with good effect. The horn should be extensively thinned to prevent irritation, and the air and wet be carefully excluded by mild dressings of softened rosin applied on tow till healed. The immediate organ of secreting the sole is probably, as we have already stated, a continuation or extension of the above red cutidural membrane.

Of the Internal Furch, or Frog. Having described the *Cutidura*, the *Podophylla*, and the *Vascular Sole*, we proceed to a description of the internal frog, as it is seen making common surface with the above parts. Intending to expose its remarkable internal arrangement and construction, which was not known till we detected it about twenty years ago, the most erroneous notions having prevailed before respecting it.

We have formerly had to remark that the horse's furch, or frog, was allied in many circumstances to the pads of some of the other tribes of quadrupeds, and also, that although composed very much of the same general materials, they were more extraordinarily and elaborately combined than in those simple cushions, and of which we shall now endeavour to convey some notion.

The horn of the furch, already described, is of necessity lined immediately within by the membrane which secretes it, and which membrane, we are disposed to conjecture, is an extenuated production of the red cutidural investing membrane we have formerly noticed, and which we are led to believe is the universal genetrix of horn throughout the foot, which view will much simplify and facilitate our comprehension of its mechanism, and of the general arrangement of its parts.

We must, however, correct this familiar generalization, by stating a material circumstance as yet unobserved in the structure of this important part of the foot, which will not fail to render our notions of this matter more just and clear, and without which it would be impossible to entertain; it is this—That if we view the whole entire surface of the cutidura in all its extent, we shall see that it will be necessary to divide it into two distinct parts or regions, according as it is situated above or below the *fossa*, or notch, in which the secretory lower edge of the frog-band is inserted, as we formerly described, since this *supra-fossal portion* is alone giving off, or secreting, this band, and the other, or *infra-fossal portion*, which is vastly more extensive, is alone giving off, or secreting, the wall of the hoof;

this latter, for distinction, we propose to call the *Onuchal region;* the former, *The Perioplic region* of the Cutidura.

Now, since it is the superior of these, or perioplic region of the Cutidura, which alone gives off, and secretes the furch-band, and which secretory surface being continued on to the bulbs, becomes wider in extent and enlarged, in order to supply the greater demand of horn there, and next continuing its course to the base of the furch, it secretes this also, and then indeed the whole of the horn of the frog. And which division is necessary, since this horn is essentially in its nature different from the horn of the wall, or that of the sole, and is appointed the peculiar production of this region, of which the whole secretory surface of the frog is part.

Having thus far premised, we next observe it is the secreting membrane of this supra-fossal region that lines immediately the horn of the furch: though of so delicate and fine a texture is it, and of such extreme tenuity, that its existence is rather to be inferred from the necessity of it, than as becoming an object of sight: but such is the case with many important membranes of the body; even the cuticle itself would be hardly an object of the dissector's regard, though brought into such conspicuous evidence by the application of a blister to the skin.

Within this secretory membrane is a square capsule of ligament, as I first apprehended, but believe it on further search, more posteriorly, rather of a soft elastic cartilage; it is well defined outwardly—its inside rough and irregular; narrowing a little downwards, and presenting three sides of a square, filling the two sides and bottom of the horn of the furch. Upwards this capsule is open, its sides mounting over the ridge of the union of the frog and bar, and it then can be traced along the sole, and is found terminating in mixing with the granular cartilage surrounding the extremities of the coffin bone; it cuts smooth, and dries transparent, whereas the elastic ligaments within its inclosure are nearly opaque and rough in their exterior when dried. Within this capsule are observable transverse layers of

tendon or ligament, which also are somewhat inclining to cartilage posteriorly; the lowermost appear to be attached to the sides of the capsule; the uppermost seem to pass above it, mingling with the general ligamentous stuffing above; and about the middle of the frog or its cushion the layers are about six or seven in number.

Between these horizontal plates of tendon or ligament, which are very lax and arching upwards, (but immediately become tense if any pressure is exerted on the horn,) is lodged a soft, flaccid, glossy membrane, strongly adhering to the surfaces of these plates, and if dragged by the forceps, immediately discloses its membranous and tangible nature, and appears to be held by numberless threads or small vessels to these plates. This elastic matter is of a white colour, or of a reddish white in the recent foot, but in process of time, or by disease, it assumes a yellowish colour, which has occasioned it to be strangely mistaken by Professor Coleman for yellow oil, and these transverse tendons for bags, and which said bags, and their oil, have been supposed the agents of the most extraordinary offices, such as forcing the side cartilages of the foot, &c. &c.—See *Coleman, Vol.* 2, *p.* 123.

This lax material, lodged between these plates, seems to be nothing more than a simple membrane, and from its laxity capable of great extension, which its situation, and the impulses of the foot against the ground, must often call into strong action to secure the capsule; and its office is also that of deadening feeling and sensation, and of protecting the important parts immediately situated above, such as the joint of the foot itself, and the tendons going for insertion into the coffin bone, and which are passing under the shuttle bone. If we make a perpendicular section of the furch about its middle, these membranes will be seen protruding from between these transverse tendons, especially on pressure, and receding again on its removal.

Now this capsule, with its transverse layers of ligament, give the fundamental plan of structure of this singular part, and these con-

strated layers, as they pass anteriorly, approach each other, and near the point of the frog coalesce in forming one very stout, strong tendon, which is affixed to the posterior semi-lunar excavation of the coffin bone about its middle, holding the furch firmly to this situation. Passing backwards, these transverse tendons appear to become diffuse and more numerous, and thin and flaccid, and finally are lost in the elastic stuffing which fills the central and posterior parts of the foot, and which is hereafter to be more fully considered.

The above most singular apparatus seems admirably designed to break and diminish the force of any sudden shock or percussion on this tender and very exposed part, and this important office appears to be performed by each of these layers in succession receiving the impulse of the stroke, and transmitting it with a continually diminished effect to the next above; so that before its arrival at the parts protected, it will be rendered so weak and powerless as to be incapable of doing mischief, or even, perhaps, of conveying much unpleasant impression. This singular apparatus therefore may be safely regarded as contributing to strengthen this weakest part of the foot, and of confirming the force of his step, and as being one among the many provisions which belong to this highly-endowed animal for the augmenting his utility and powers of serving us.

In concluding we may also add, that we think it not improbable that the ligamentous, or rather, semi-cartilaginous parts of the internal structure of the furch, may be derived from an extension of the hardened part, or ligamentous *substratum* of the cutidura, although so remotely placed, as to be with difficulty traced to it.

On making a perpendicular section of the furch about its middle, we may observe its capsule is surrounded to some distance, as rather more than to the extent of the eighth of an inch, by a white, opaque, and soft horn; which opacity and whiteness of the horn is found to arise from the vessels that are entering it, and which may be easily drawn out, and they then appear to be of a conical figure. The moisture thus contributed is the cause of this opacity, and as it

advances forward, and becomes more dry, it assumes the dark transparent colour that we see the horn of the frog to have. And we are led to doubt if this opaque white frame of horn may not perhaps define the limit of those deep exfoliations of the frog we have formerly noticed, and which may extend to the point of these vessels. The succulence of the horn beyond these vessels is maintained, perhaps, by a species of mechanical absorption of the fluids given out by these vessels, as also from its exposure to the moisture of the ground.

Having now described the various parts forming the surfaces which are exposed when the hoof has been removed, we shall proceed to consider the parts which are found immediately beneath these, and which, for the sake of rendering this demonstration of the foot as clear as possible, we think it best to form into a separate order from the attaching parts, and to call them our third division, making the bones the fourth, instead of the third, as we originally proposed; and this arrangement, we believe, will be useful in affording us a greater clearness of view of the several classes of parts the machinery of the foot receives, and the order of their succession in forming it. This new order will consist chiefly of the ***Reticulum, the Cartilages,*** and the elastic resilient ***Stuffing,*** which every where fills up the frame of the posterior parts of the foot, and which order we designate for distinction ***The sub-attaching parts.***

DIV. III.—SUB-ATTACHING PARTS.

Of the Reticulum processigerum. The *podophylla* are not, as has been asserted, really placed on the bone of the foot, but are planted upon a highly-elastic web, or thickened membrane, we have called by the above name; it is found in greatest substance or depth in the

front parts of the foot, and being of considerable thickness, receives within it an infinity of large blood-vessels, chiefly veins, which, anastomosing and running through it in all directions, give to it a singular beauty and rich appearance when injected with coloured wax. And the fluids contained in these vessels, by readily yielding to all impressions conveyed by the hoof, will contribute as a sort of cushion to soften these effects, and which is not at all unnecessary in the sometimes incredibly-long protracted journies they are made to perform; they will also tend to preserve the foot from the inflammation which might otherwise attend such unreasonable labours, doing perhaps within the hoof, in some degree, the offices that are done without by the pads and stuffings of the camel's feet, into which their feet sink down. This vast congeries of vessels will act also as a reservoir for the blood, which must be determined in great abundance to the feet on these occasions, and also serve to equalize the pressure, keep the parts moist, and prevent any sudden heatings or chillings from exposure, or any arrestation of the free circulation of the blood from unequal bearing or pressure of the foot, by their frequent anastomosings. The extraordinary extent, elasticity, and thickness of substance, will occasion it also to contribute almost, or quite as much, to the motions of the bone in the hoof as do the keraphylla, or indeed more, those being designed chiefly for strength of attachment. I need hardly add, that I have called it *Reticulum*, from its being formed of a net-work of fibres, and *processigerum*, from *processus*, and *gero*, bearing or carrying the processes; for parts without a name are almost as parts without an existence. This elastic web, on meeting the lateral cartilages, passes over their surface, adhering strongly to their lower parts, and so situated, is conferring a still more extensive power of elastic yielding to these parts. And it is not clear to me whether this Reticulum is an immense amplification and extension of the periosteum, or a production simply of the cellular membrane, but believe the latter.

Of the great Podal Cartilages. These cartilages of the foot being of a very different character to cartilages in general, ought to be distinctly classed, but we fail in a proper name for distinguishing them; however, in some degree we do so, by calling them the *podal* cartilages, as contra-distinguished from articular and other cartilages.

Not unaware, from former experience of the difficulty attending the description and the understanding of these cartilages, from their various structure, and their commixed and diffusive nature, so am I led, in making this attempt, to give along with their description the manner and process I have pursued in investigating them, that others may be enabled to arrive at the same view of them, or correct any errors I may inadvertently have fallen into respecting them, if such should be the case.

For this investigation I do not recommend the usual practice of macerating the foot in order to disengage it from the hoof, which would damage and discolour many of the more delicate parts connected with these cartilages; but after having procured a fresh foot, to proceed with it in the following manner:—first to use a drawing knife to detach the sole from its union with the wall—then to employ a fine saw, making several longitudinal cuts quite through the wall, drawing the detached pieces off upwards by a pair of pincers, and thus removed from the sides of the foot a pretty extensive portion of the hoof: we then dissect off the skin, and afterwards the web and the cutidura.*

The cartilages now present themselves in a denuded state, occupying a considerable extent along both sides of the foot; outwardly they are of a tolerably smooth and uniform surface, convex and

* I shall not conceal it, however, that I often use a more summary process still to rid the hoof; and for this purpose make deep diagonal cuts with a saw through the lower parts of the hoof, so deep as to expose the red edges of the vascular sole, removing both sole and wall to some distance, securing the foot in a square box nailed to the work-bench or table; next by longitudinal cuts into the wall with a flat wrench of iron, I easily remove the pieces; if it be a cart-horse especially, where the parts are seen on a large scale, the process is vastly facilitated.

curving to the figure of the foot, of which, indeed, at the posterior parts they confer the principal figure; in their middle they are somewhat hunched, or gibbous, opposite to the ends of the shuttle bone, and condyles of the coronet bone; and in their lower parts are much perforated with blood-vessels, especially posteriorly.

Their general figure may be compared to that of a fan pretty fully expanded, and fixed by its centre, which is also much thicker, as well as by one limb at its lower edge, and in part only, firmly to the side of the coffin bone, posteriorly and near to its top, securely lodged in a wide, oblong, and tolerably deep cavity provided for its reception.

The upper region of this cartilage rises boldly above the hoof, and may be distinguished from the other parts of it by the term *Coronary Process;* it is beautifully incurvated, and reflected over the softer internal parts of the foot, affording a roofing and defence to them, and also a noble outline to these parts. It terminates by a thinner rounded edge, often deeply toothed, and notched or scolloped. If cut into, its substance appears to be firm, smooth, and delicately white.

In order to investigate the structure of the cartilage lower down, or near to its central region, and to obtain a view of its interior appearance, we make an incision with a knife through its whole length, and one or two crucial incisions, traversing the former at right angles, we then are enabled, with a little dissection, to loosen its attachments, and to reverse the position of these pieces, and detach them wholly, or in part from their adherence; and we discover the interior surface to be very different from the outer, being of a softer, more spongy and elastic nature, and with more redness and colour, and extremely knotty and irregular; and within it, an abundant distribution of large blood-vessels, chiefly veins, every where lining this inside; and if we were to conjecture their probable use, we should say that we believed them intended to assist in keeping up the temperature, and consequently the life and elastic actions of this part, itself nearly destitute of blood, and for maintaining it against the effects of injurious exposure, whether of excessive heat or cold.

I may further observe of this remarkable plexus of blood-vessels and cavity that is found behind the cartilage, and which appears conspicuous enough in a vertical section of the foot transversely made across the quarters, is of an oblong shape, and has not before received much attention; and I have been led to consider it as a kind of reservoir for receiving the blood that may be pumped up during any strong or rapid exertions of the animal, from the effects of the motions in the hoof of the bones of the foot, which, accumulating in these large vessels, contained in a spacious cavity, is thus prevented from creating derangement to the general current of the circulation, or causing, by its impetuous course, any sudden rupture of the finer vessels of the foot.

I have subsequently found, or imagined at least, that the above-described cavities behind the cartilage were not exactly alike on both sides of the foot, and that the inner one was rather larger than the outer, and the course of it not so straight. These cavities are loosely filled with cellular membrane, retaining the vessels in their place, which the saw often entirely removes, and leaves it a perfect void: the passage downwards from these cavities is very straight, and terminates at last upon the inside of the extremity of the coffin bone exactly within the scutiform process. If we desire to lay this part open at once with the saw to obtain a view of it, it is only necessary to place the instrument about the middle of the cartilage, at its most protuberating point laterally, and then sloping it to the axis of the hoof, we shall either plunge directly into, or so near it, as to obtain a sufficiently-favourable view. This cavity may be called the *infundibalum*, being a sort of funnel, and its straight pipe may be termed the *Canalis vasiferus*.

Some blood-vessels are also seen streaming down on the outside of the cartilage, coming from the interior, and probably assist in maintaining the same vivifying influence and warmth on the outside that we have ascribed to those on the opposite side.

The inside cartilage, we have thought, was often larger and thicker, and more protuberant than the outer, and that it was more deeply secured in the bone. Whether this may have any reference to the blood-vessels of this side, or to the opposite foot, in lessening the danger of its being disturbed by a casual blow from it, I shall not presume to determine.

It appears now to be necessary previously to entering into further details respecting the cartilages, to advert to the coffin bone which supports it, and which the reader, as they are easily to be procured, will do well to consult, obtaining one of mature age and well marked: in the subjoined plate, however, No. 6, there is also a view of it.

We shall see in examining it that the excavation for the insertion of the cartilage is near the summit of the bone, and posteriorly both wide and deep, that it grows much narrower as it advances forwards, becoming a thin channel only, losing itself on the front eminence of the bone. This channel, however, is not confined solely to retaining the cartilage, since it receives a strong ligament from the coronet bone, anteriorly to the cartilage, and the channel on the eminence itself in front is occupied by the expanding termination of the tendon of the extensor of the foot.

Immediately behind this cavity, or posteriorly to it, there suddenly rises up from the bone a remarkable flat square plate of bone, often, however, especially in the young bone, rounded on the top, which is always grooved, in order evidently for the greater security of the cartilage. To distinguish this prominent feature, we shall call it *The scutiform process;* it is powerfully supporting the cartilage from any dislodgment, being opposed to the deep hollow cavity immediately before it; and it is singular also that it should be placed nearly in the middle or central point of the whole cartilage: it is also worthy of attention that it is found to be the very point of commencement of the ossification of the cartilage in all the specimens of ring-bone that we possess, which appear, indeed, to be but as the

continuation or extension of this very process.—Being placed near the waning extremities of the coffin bone, it must afford to them a remarkable support; and it is also found to be immediately opposed to the two pointed extremities of the shuttle-bone, strengthening the articulation at this important part, all of which circumstances render it necessary that it should be distinguished by a proper name as one of the most notable parts of this bone. We now again revert to the cartilage.

It is by no means an easy matter to sub-divide an irregular convex mass, like the cartilage, into intelligible divisional boundaries for description; and after viewing it in many ways, we propose only to use the terms *coronary*, or *super-onuchal process*, and *inferior*, or *infra-onuchal process*, according as they are situated above or below the surface of the hoof; adding to these the *anterior* and *posterior limbs*, which are partaking of both situations, and to which must be added also the *interior* or *stratiform process*.

Of the Anterior Process. This limb in passing forwards, is firmly attached by its lower edge to the coffin bone, in the groove we have indicated; but when advanced to a certain distance in the front, it combines intimately with the ligament which holds the coronet bone to the coffin bone, and they are both inserted together in the same groove; their union is by oblique lateral surfaces, and is of the most intimate kind, so much so, that an inadvertent dissector might easily view them as one body. They then meet the great extensor tendon of the leg, and are connected loosely with it by cellular membrane, so as to be easily separable, and with which they make one common general surface. This anterior extremity of the cartilage takes a very strong adherence by its inner surface to the condyle of the coronet bone laterally, and anterior to the above ligament. And this portion of the cartilage also closely surrounds the coffin joint, that the articulation appears to be without any proper capsular ligament at this

part. In some feet, however, we apprehend we have seen it sufficiently conspicuous,—whether this is depending on the degree of violence with which the animal has been used, I know not, as its relaxation, it would be natural to suppose, will very much depend upon this. In operations, however, we may observe, it should be a primary object to preserve it untouched.

If we cut into the substance of this front portion of the cartilage, we find it firm, solid, and very white; but its inside surface, or surface exposed to the joint, is more spongy, and often reddened with blood. And this anterior limb, we may remark, is very rarely ossified in case of ring-bones, which invade nearly all the superior and posterior parts of the cartilage without difficulty,

Having removed with the knife the superior part, or coronary process of the cartilage, we, by detaching successive slices with the scalpel, come to parts containing tubuli, or pipes, which appear to rise up within the solid matter of the cartilage; and lower down, these are succeeded by denticulations and breaks often, with dovetail points, and sinuous, irregular, cavities, breaking into the inner edge of the cartilage, and containing a red membrane. These membranes are doubtless blood-vessels,—veins, chiefly,—which are perhaps aiding, as we have supposed, in supplying the vital warmth we have described, and also in opposing the effects of an intemperate exposure, the cartilages being otherwise in themselves almost inanimate parts, and destitute of nerves or blood-vessels. And these numerous breaks and interruptions in the substance of the cartilage, will, we apprehend, essentially contribute to maintain their elasticity, and oppose the process of ossification also, to which, unfortunately, these parts are but too frequently liable.

Towards the extremity of the foot, this cartilage exhibits a stellated or radiated appearance and contexture, the rays or circles of which converging to a central point, do not entirely meet there to fill it, but leave a small opening through which a blood-vessel is seen to pass;

and generally these vessels have an horizontal direction given them. It is doubtful with me, whether from this termination of the cartilage in the extremities of the coffin bone, a thin stratum may not be sent off to the assistance of the posterior membranes of the sole and frog; dissection, however, does not seem to demonstrate any such, though a vertical section of these parts being dried and varnished, exhibits more transparency in them than is usual in mere membranes and ligamentary parts.

We have also observed that, by making a section with the saw vertically between the furch and the bar, or in the commissures of the foot, we can, by afterwards removing the bar and sole, get an excellent view of the concave inside surface of the upright cartilage, and which is exhibiting a triple row of openings, or *lacunæ*, for blood-vessels, which pass into, and also through this cartilage; and these openings have small remarkable partitions of cartilage disposed between them.

On reducing the cartilage farther, we arrive at a portion of greater thickness, and which appears also to be passing inwards, and is of a more irregular texture and darker colour often: to distinguish this internal part from the upright portion, we have called it

The internal cartilage, or *stratiform process*, which has baffled us completely for a long time in rendering any satisfactory account of or obtaining any notion of its extent and connexions; it appears, however, to be not merely a general supplementary intermedium for filling up vacant parts not occupied by the machinery of the foot, but is lending its useful aid in sustaining some of these parts.

After many an unsuccessful attempt to unravel its real extent and figure, in which I hardly ever arrived twice at the same conclusions, I found that the readiest way of getting a fair view of it, was by means of a saw, which should be passed through the hoof in an horizontal direction, and in a line parallel with its upper edge, and at the distance from it of about half, or three quarters of an inch only: this proceeding, I found, exposed it through the middle of its most

extensive distribution inwards, and informed us that it was passing interiorly as far as the ridge formed by the union of the sole with the bar, or inflexion.

This internal cartilage is of a coarser grain and looser texture than the upright portion, and softer and more yielding; it cuts, however, in many parts with sufficient crispness, like cartilages in general; its very interior part is, however, more broken and interrupted, and often browner, as though of a coriaceous, or leathery consistence, or, as partaking of the nature of cartilage mixed with ligament.

This interiorly projected process is replete with sinuous fissures and openings, where it unites with, or proceeds from, the inside of the lateral cartilage; but more especially these openings are found most numerous at its posterior parts, and will obviously serve to render it more pliant and yielding to all the movements of the hoof, and particularly so in accompanying those of the more flexible sole and frog.

After much time spent in investigating this obscure part, we find that it is perfectly incorporated with, and proceeding from, the upright process; and we at last found that its commencement was nearly as high up as to be on a level with the brim, or upper fine edge of the hoof, where it may be felt by the fingers, after we have severed and removed the upper portion of the coronary process; small, rough points, and elevated flexible ridges of cartilage, are then perceptible on its upper surface, which bend to the touch of the nail, and are hardly observable but by tact, being covered and obscured by dense membranes.

It is not possible, however, to arrive at a knowledge of this intricate part of the cartilage by these means; but we shall now proceed to point out a perfectly new way of dissecting it, that will render it perfectly clear, and afford us an effectual and satisfactory account of it, which is by exposing it on both its surfaces at once.

To make this disclosure, we pass the knife in an horizontal direction through the cartilage, close to the superior fine edge of the hoof,

carrying it to the bone, which we then saw half through: we meet this cut by a vertical one, slitting the coronet bone longitudinally down to the former cut, thus making a half section of the foot, dividing all the soft parts with a sharp scalpel.

On removing the portion cut, a beautiful view presents itself in a half longitudinal section of a part we cannot otherwise so well contemplate, and which at the present, for want of a better name, we shall designate *The Glairey Mass or plastic stuffing;* it is observable, lodged between the skin and the tendons, of a pyramidal form, reaching to near the summit of the coronet bone, upwards diminutive, but enlarging downwards, and reposing by its base upon the globular mass of elastic ligament, and so intimately attached to it, that it would easily pass but for this view of it, and its very different texture, for one body, and indeed the mass below, requires this along with it to constitute the globular body we have described, making separately, or alone, only an oblate or flattened globular figure.

This glairey substance is the most limber, soft, ductile, and yielding of any animal substance that we are acquainted with, and in its non-resistent qualities nearly approaching to that of a fluid.

We remove this, and also the oblate mass of elastic ligament together, and we then obtain an excellent view without difficulty of the whole upper surface of the stratiform process, which presents the figure of a flattened concave or shallow bason, particularly well adapted to the retention of the above ligamentous bodies.

We must now carefully proceed in removing all the hoof from the bottom and sides of this posterior part of the foot in the way before intimated—by sawing off diagonal slices of its lower parts, and we remove also half of the horn of the frog. This will enable us conveniently to detach the membranes which line the hoof, and envelope the cartilage on this side, and we then obtain a perfect view of the cartilage on its inferior surface, and where it is found covering the ridge of the commissure of the hoof, which is formed by a triple union of the sole, the bar, and the frog. In passing upon this ridge,

the cartilage becomes so extremely thin that it does not much exceed in thickness a half-crown piece, that is to say, in a blood horse's foot. Having passed over this ridge, this process of the cartilage again thickens, and enlarging every way, is rising upwards, and forming the interior rim of the bason or concave we have just described; descending also below, and considerably enlarging in this direction, it occupies the interior of the broad base of the frog; and also advancing forwards to its middle parts, it divides and interiorly separates into coarse horizontal plates, having between them the elastic membrane, forming the apparatus that we have formerly described with the frog, and which apparatus is continued to within some short distance of the point of the frog. These plates are placed in lines parallel to the bearing surface of the hoof on the ground; they have, however, a trifling elevation forwards, and sinking posteriorly, making a small angle to the horizon. They are evidently forming a most useful sort of defence to the important tendons placed over them, and which, we may observe, are also farther secured from the disastrous consequences of bruises from external violence by the moveable and unfixed condition of the shuttle bone, against which they would both be impelled in these cases.

We can now readily discover, that the inferior surface of the stratiform process, like the superior, is cupped also, but with its concave presented in the opposite direction, and this inferior side or surface is also in figure an oblong oval, and vastly deeper than that on its superior surface; so that in reality this process of the cartilage is in figure a double concave, the one circumscribing the ridge of the commissure, and the other presenting a flat bason for the convenient retention and lodgment of the globular body of the elastic stuffing.

And now, when all the difficulties on this subject have been removed, on looking at them we are only surprised that they could have detained us so long in embarrassment; for we believe these elucidations will be found in no preceding writer, or scarcely even allusion made in any way to such a part. And we hope also that the

gratification we have experienced in clearing up this arduous knot, (for such it has been,) may extend to all who have an interest in, or derive pleasure from, the services of these most worthy creatures.

For the greater convenience of considering and speaking of this remarkable part, we had in a former edition applied the term *Stratiform process* to it, as being placed in a parallel direction to the *stratus, street,* or *road,* on which the horse was moving, in contradistinction also, to the upright or lateral process; which appellation we believe we cannot do better than to retain.

Of the posterior limb of the Cartilage.—This extremity of the cartilage sloping downwards rather suddenly, on arriving at the extremity of the foot, is curving inwards to encircle it, and form the frame of the *cartilaginous bulbs,* which we have so called to distinguish them from the horn bulbs which envelope these externally, and which with nearly all the other parts at the back of the foot or leg, have been at times vulgarly termed heels, evidently a phrase without any meaning in our art, and not being of the least use is therefore expunged.

These bulbs curving inwards are disposed of in the way we have described, and interiorly become intimately interwoven with the elastic stuffing, and along with them is carried in also a process of the skin, deeply insinuated into the sinus, between the two bulbs, and which is powerfully aiding from rupture these tender and exposed parts of the foot. It is also especially to be remarked here, that this process of the skin is forming a loop or doubling by being thus carried inwards, and its two surfaces being cemented together, they become, when from any cause they are opened and exposed, the true cause and genuine seat of that disagreeable disorder called the Running Frush.

Of the Uses of the Cartilages.

These extensive cartilages are made to serve many important purposes in the business of the foot, some of the more leading of which we shall here endeavour to expose. And in a foot having such extraordinary demands upon it, it will be evident the resistance of a solid unyielding body would have been quite inconvenient in the sides and posterior parts of it at least, so that on this account they occupy so very large a share of it as a substitute for bone, battening out, and supplying the form of the foot in these parts to a considerable extent: for the coffin bone, except by its extremities, does not in reality extend much beyond the middle of the hoof; the rest of its figure is almost wholly communicated by these cartilages, strengthened and assisted by the hoof.

And the singularly-small appearance which the coffin bone makes, when compared with the hoof it belonged to, is chiefly occasioned by the extensive share of its upper parts, more especially, occupied by these widely-distributed cartilages, the supplementary intermedia, of the foot; and which are assuming in their course an extraordinary variety of thickness and hardness according to the parts they fill up, or offices they have to perform; and which become, if held rigidly, and deprived of their natural motions, osseous, or converted into bone, especially in their more solid parts, and then have obtained the name of ***Ring-bones***, that is, bones of the ring, or superior circle of the hoof, the coronary process being more especially liable to this affection.

Both portions of the cartilage united, circumscribe the lateral and posterior boundaries of the foot constituting a kind of elastic general frame upon which it is highly probable the horn is first receiving its form, and which also extends as this part extends with age; the cartilage, also, we should apprehend, must grow and increase with the developement of the frog, since this organ at birth is little else than thin horn and membrane.

It is forming also in the posterior parts of the foot, superiorly, a sort of box or capsule, by the union of the transverse with the lateral processes, supporting the elastic globular bodies and their coverings, and which process thrust upwards is equalizing the general pressure from the sole and weaker posterior parts of the foot. The cartilage descending into the body of the furch performs the office of a core or expanding mold on which the furch is furnishing and receives with its increase its ultimate form, which view opens to us new and more simple apprehensions of the structure and developement of this part, and removes the necessity of imagining any other capsule than what is furnished by the thickened mass or exterior frame-work of this cartilaginous process, which is immediately covered over by the kerapoietic membranes. About to enter the furch, however, the cartilage becomes more broken and interrupted in its mass, and more granular, and finally severs into plates interiorly, which singular apparatus we have formerly described, or rather as we have sometimes thought, these plates may perhaps be considered as proceeding from, and formed by, a process sent down from the globular bodies, or the cartilage supporting them, and which is passing between the two descending portions of the stratiform process, which are lining the furch laterally, and meeting on the bottom of the middle of the frog longitudinally, become united and form its capsule, and thus circumscribing in its interior the above apparatus. A preparation of a thin transverse slice, dried, varnished, and rendered transparent, would seem to authorize such a conclusion. So that cartilage appears to be the pervading principle in the hind parts of the foot, as much as bone and ligament are in the anterior parts of this machine.

Another important office is performed by conveying the skin or *cutidura* rather, to its lodgment in the coronary concave of the hoof, and afterwards by resting against it, is perhaps facilitating the secretions of the part, and by its elastic spring also, is enabling it to follow all the movements required by these parts, without the danger of a dislocation. It gives also to the foot an embossed and noble appearance

externally to the eye. It protects the coffin joint and strengthens it in a remarkable manner from the disorder which a lateral thrust of the coronet bone would occasion it. The hoof itself also is in a degree elastic, bending, and accommodating itself to the more violent motions and distortions of the foot, easing thus the interior parts, which otherwise would be bruised and suffer from resistance.

A still more important office remains to be exposed if we can succeed in making it intelligible,—that of supplying the coffin-bone with a considerable share of its means of motion in the hoof; for it is to be remarked, that as the coffin-bone is obliged to describe in its descent under strong pressure from the limb and body, a small portion or segment of a circle, at its back parts, round its centre of motion, or rather its more fixed parts, (for there is no part of it wholly fixed,) towards the front of the foot; so this could not have been so well accomplished had the bone itself been fixed at its upper part to the keraphyllous processes in front of the hoof, these being too inconsiderable to afford in that part of the bone the extent of motion required, but by the intervention of an elastic cartilage between the bone and the internal surface of the hoof which is carrying the processes; the bone is thereby acquiring a greater liberty for action, and the movement of its upper parts, to perform the necessary depression.

Another useful office appears when we consider the horse in violent action; the pastern and coronet bones are then forcibly drawn from their backward position, over the front of the hoof before the foot quits the ground, and consequently will force these posterior parts backwards and downwards with great power, and sink and depress them very much, but which are prevented from disunion and rupture, by being contained within the encircling hoof, and the elastic yielding body of these cartilages and the furch, will aid in restoring them to their first position, the horn furch also assisting—and where the cartilage again would be inconvenient or unnecessary, there we find the *reticulum processigerum* is supplying its place.

A perpetual shoe would soon be intolerable, but for the nature of

this cartilage, and the large share it occupies in the structure of the foot, for being highly elastic, and having, as it should appear, but little vascularity or sensation, it gives way to the impression; and it is a circumstance deserving particular attention, whether in cases of contracted hoofs, the pain may in reality so much reside in the posterior parts of it as in those placed more anteriorly, where there is greater solidity, resistance, and sensation, as with the sides of the coffin-bone and in its immediate coverings.

Of the internal bulbs, or resilient globes. Having before had frequent occasion to allude to these parts, there will be less necessity now for enlarging upon them. It may be observed, however, that these two globes are forming the foundation of the two spherical bulbs, which the horses foot is seen to present posteriorly; and lodged in the superior concave surface of the stratiform process of the cartilage are occupying a space extending from the posterior surfaces of the flexor tendons to the incurvations of the cartilages, and from side to side they occupy the space that is between the concave surfaces presented by the lateral cartilages interiorly.

If we examine these bodies more attentively, they would appear to be formed, of two flattened globular masses, having circular or concentric rings of ligament or tendons disposed through their entire substance. On rending these bodies from their bed, we leave a most irregular uneven surface to the cartilaginous cup, full of rough knots and lines, which we now find to be the real roots of attachment of these globes to this receptaculum, and that what appeared concentric tendons or ligaments, are in reality the continuations of these irregular plates or processes, which are indeed perfectly cartilaginous, and are found to become the concentric rings we had before called tendons, but instead of concentric circles, which a casual inspection would easily ascribe to them, they appear transversely disposed in lines, curving or bulging posteriorly as they rise from the hollow cup, and growing thinner as they pass upward, they terminate

abruptly at the upper part of the ball. This disposition prevails as far as to the middle of the receptaculum, when their order appears to be reversed, and the rising lines of semicircular cartilage then curve, or bulge anteriorly, and ascending like the former to the superior parts of the globe, approach, but do not actually meet the former, and thus form together an imperfect appearance of concentric circles. Those situated upon the posterior half, appear to be somewhat more robust and strong than those springing from the anterior distribution. Interposed between these cartilaginous semi-circles is a soft *gelatino-ligament*, of a consistence rather more inspissated than the glairey pyramidal masses we have described above them. The rough surface of this concave receptaculum, which we had formerly described "as defying dissection," is in fact formed or made up of these divided lines and ridges of cartilage, and which understood, will render the part intelligible enough.* In passing the finger, which becomes an indispensable instrument in investigating these parts, round the brim of this basin on the inner quarter and behind the *vascular infundibulum*, we detect a stout tendon, almost cartilaginous, and which we can trace downwards into the cup of the cartilage, inserted close to the internal edge of the perforans tendon, and uniting with it: upwards it can be traced enlarging and passing along the inside of the pastern bone densely envelloped in cellular membrane till it is lost again upon the fetlock joint. This singular part is not of constant appearance and especially in the smaller horses.

* I observe Prof. Coleman has jumbled together all these parts, under the coarse and erroneous term of the *fatty frog*, and states them as abounding in oil and fat, in a way that would almost glisten the eye and engage the speculations of a melter of tallow; and he adds also by way of confirming it, that he has made an experiment by which he ascertained the precise quantity of fat contained in the said fatty frog, which consists in boiling it in oil! when he informs us one-third by weight was lost, and therefore infers, that just so muchfat was "evaporated!"—(Tr. On Foot, p. 108.) It is true his lucubrations may have been to him a subject of extraordinary fatness, when so many purses of twenty guineas each, were obtained for such information as this, for not one particle of fat or oil could I, who have found the subject a lean one enough, ever discover in them; and as to the loss he describes, it is in reality nothing more nor less than

I have also observed that we may lay these parts open to great advantage, by a vertical section of the hoof through both commissures, when also may be seen some remarkable circumstances in the apparatus attending the tendons and shuttle bone and its attachments.

Having given the horny parts of the Horse's foot, with the soft and the semi-soft parts, we shall now, contrary to our first intentions, give the bones also, that we may present the work in a tolerably complete state, as far as these organs are at least necessary to be known for the illustration of the shoeing art, the most important and most difficult branch of our profession. It will cause the present part in the number of its pages to exceed any former one; but we trust the

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the amount of the water or lymph contained in said parts, which would inevitably be forced off in a heat of from four to five hundred degrees, the heat of boiling oil. The experiment exhibits a remarkable ignorance in the analysis of animal substances, for even had fat existed it would not have been at all detected by these means.

This egregious nonsense was not noticed in my former edition, nor would it have been in this, had I experienced the smallest attention or encouragement from this Professor of the art, whose labour it has been by false and artful insinuation, and sometimes pretended attacks, to misrepresent my writings to the class, and destroy the reputation of their author, and from them with the public; no doubt at times pretending to praise him, but only the more securely to conceal his purpose, under the disguise of candour and fair conduct. The Lancet, and other Periodicals of the day, exhibit a complete proof of the untenable nature of his doctrines, even where he thought himself most secure; so that of what value can a diploma be, that so many are seeking so anxiously, from such hands, when nearly all that he and his partner have taught has been totally overturned. The establishment was a noble one, in which he had no hand, but has abused it in many ways, till it is made a point of obstruction to the very advancement of that art it was intended to foster and improve; indeed we may say, as we once before stated, in *the history of the advancement of Horse knowledge*, that "the sacred path of knowledge in the arts and sciences as well also as of religion herself, cannot be left too free;" professorships and stipends, especially when large, and patronage soon from sordid interests, choke the fair avenues of their progress and retard their course:—should they not therefore be so formed as not to tempt the aspirings of the ambitious or the graspings of the avaricious? A body of men freely chosen from among the profession itself, should, after due examination, grant diplomas to those in whom the public may have confidence, when the greatest utility and satisfaction would be found by employing such votaries of this profession about their horses.

concise manner in which it is written and the novelty and importance of its contents, will be thought by our readers a sufficient apology.

Of the Bones of the Foot.

*Of the Coffin Bone**—which is perhaps of all the bones in the construction of the animal the most necessary to be well understood by the Veterinarian, therefore we are induced to add its description to that of the former parts, and what appear to be the leading circumstances of its œconomy.

It is the nucleus of the foot and the basis or point upon which is expended the whole weight and exertions of the animal, and these impressions conveyed to the hoof by its remarkable construction and most beautiful provisions, they are communicated by it harmless to the ground.

When fully perfected by its natural and unrestrained growth, or as nearly so as I have yet been able to obtain this bone, it presents in its general figure a cone, much more so than does the hoof that covers it, which form will obviously impart to it a power of greater freedom in its descent and movements in the hoof, than if it had received the same figure as this part; since the hoof, as we have already fully demonstrated is truly a cylinder.

The figure exteriorly which this bone describes at its lower circumference is that of a semicircle or crescent somewhat dilated on the sides, with its posterior extremities lengthened out and projecting backwards. From its base suddenly contracting in its dimensions upwards it forms in front a considerable elevation of bone roughened anteriorily in lines and channels, for the strong attachment of the

* From *cophinus*, a basket, and immediately to us, from the French, *coffin* and *coffre*, a box, in allusion to the hoof inclosing this bone as in a box.

Ossified Cartilage.

Sydn. Edwards Delin.

F. Sansom Sculp.

extensor tendon of the foot which is spreading upon its surface, leaving, however, its extreme upper edge free. On its posterior surface this front elevation becomes part of the articulation, presenting a rapidly-inclining surface with two oval considerable cavities, (see *Pl.* 6, *c*, *c*,) which are smooth for motion, by having the usual covering of lubricous cartilage, and receive the lower extremity of the coronet bone.*

The front eminence, lofty and recurved, prevents the possibility of an anterior overshooting or dislocation of the coronet bone; and a ridge rising up in the middle of the bone between the two concave surfaces, directs the motion of the bone above, and strengthens it at this middle part from fracture. These two impressed surfaces are oval and diverging as they pass backward, enlarging also and deepening, by which they appear to confer a greater facility and diminished friction to the operation of the bone moving on them. The inner cavity is somewhat larger than the outer, by which circumstance we can detect the respective foot, whether off, or near to which the bone belongs.

These surfaces for articulation are extensive, thereby affording great strength, and comparatively shallow, by which they receive the greater freedom of motion, and the danger of dislocation, to which they would be so eminently exposed from their extreme situation in the limb, is diminished, and their security insured by the strong lateral support they derive from the cartilages, which are again sustained by the hoof, just within which this articulation is brought.

These cavities in their posterior slope are immediately opposed to the oblique line of bones coming from the fetlock joint, and is perpendicularly opposed to them, at least in the mathematical sense of the term; and it must be obvious that their pressure towards the ground would pass through these surfaces, and fall just within the

* From *corona*, or crown, the foot being rounded and full above the hoof from the embossed cartilages, which are opposite to this bone, and hence also we have in vernacular phrase, *Crownet bone.*

front circumference of the coffin bone; but on account of the very sudden slope of these surfaces downwards, by which this pressure will be diverted towards the quarters, and by the yielding of the shuttle bone posteriorly, will be directed these parts being depressed, towards the elastic provisions of the foot; which, by their spring, and quantity of elastic matter, will abundantly break and neutralize the impression.

Of the Shuttle Bone. Its name sufficiently denotes its figure, and will prevent its being confused with the bones of the human body, with any of which it has not the least analogy.—It is not made a fixture to the coffin-bone, but, placed posteriorly to it, is moveable upon an obliquely-slanting semi-oval surface at the back part of this bone, and so situated, is completing the cup of the articulation: being very moveable upon it, its fracture is prevented, and a sufficient yielding is obtained to the weight and impression.

The union of these three articulating surfaces, that is, including the coronet bone, form together, what is called *the Coffin joint*, to which it has been usual to refer all lamenesses, that ignorance or idleness in investigating, or real obscurity, does not at once discover the true source of, and has greatly tended to obscure the progress of knowledge in these affairs, and which has of late been attempted once more to be renewed under new and absurd appellations; and we may remark, had the word *foot-bone* been used instead of the technical *coffin* bone, so awfully impressive to the unlearned in these arts, half the spell of the charm would have been removed.

The shuttle bone is continually being pressed by the tendon of the perforans (which is provided with a cartilaginous or bony condyloid apparatus for the purpose) against the posterior, inferior extremity of the coronet bone, keeping it forwards upon the above semi-oval surface at the back of the coffin bone, in which office it somewhat resembles the sesamoidal bones situated at the back of the fetlock joint, and like them is conferring a power by removing the tendon to a larger angle from its insertion. The diminishing ex-

tremities of the shuttle bone are not much confined, but are loosely attached to the inside of the cartilage and scutiform process by cellular membrane, and also to the lateral edges of the perforans tendon; and the extremities or waning points of this bone leave ample space for forming a passage for the larger blood-vessels of the foot. These points of the bone, however, are held by a double tie before and behind; the anterior or stronger attachment of it advances forwards to the cartilage at the point where it unites to the coronet ligament. The main attachment, however, of the body of this bone is by a broad, short ligament, to the anterior part of the hollow in the posterior cavity of the coffin bone, situated immediately beneath it; and again also it is attached superiorly by a broad ligament from its superior posterior edge, which rising to two thirds of the height of the coronet bone at its back part, is inserted into a short transverse ligament, extending between the back of this bone and the front surface of the perforans tendon, giving it thereby an indirect attachment to this important tendon, but sufficient apparently to occasion their movements to be isochronous, or nearly at the same point of time.

Surfaces. We next have to consider the surfaces of the coffin bone, where we shall have to notice several new and extraordinary particularities: see pl. 6, fig. 1. The structure of surface which this bone presents in front, and extending some way on either side, is singularly beautiful, consisting of elevated small ribs, or threads of bone, longitudinally disposed upon it. These are not placed in exactly parallel lines, but frequently meeting one another at very acute angles, forming waving lines, and which give it somewhat of a reticulated appearance. A first view of these ribs would lead one to apprehend they were designed to carry the processes or podophylla, having a somewhat corresponding arrangement; but this is pretty clearly not the case, since they are both smaller and more numerous, and the processes are found covering the bone much higher up than these ribs are found to extend, that they are more probably provided for the support of the *Reticulum*, upon which the processes are situated. On the

above small fibres, and in their channels, the reticulum is firmly retained, evidently more so than it would be, on a plain surface of equal extent, or on a surface even as extensive as this is rendered that was perfectly smooth. Deriving a power from the lateral ridges, and their impressed channels, for holding the membrane, that no plain surface could give.

The surface of the bone above these threads or fibres is very much roughened, and formed into asperities and depressions for the firm adherence of the same membrane, and there is also seen a numerous collection, chiefly in front, of small pores and perforations for blood-vessels.

In the very middle of the lower front edge of this bone is a small excavation or notch; and above this a prominence, nose, or *prostasis* of bone, covered also with the fibrous structure. This *prostasis* is not by any means a constant feature, but is frequently wanting; the excavation is more uniformly found, and is no doubt denoting a distant affinity with the cloven foot.

The sides of this bone, where the fibrous structure terminates, exhibit a new and most singular organization. The bone considerably enlarging at this part, is thrown into plates or scales, forming an oblong lobe of some extent; and these plates are disposed outwards, and inclining backwards, in almost regular lines or ranges, one over another like tiles, or the scales of fishes, but not in contact, or appearing to touch, having a space between them. The exterior thin edges of these plates present numerous sharp points and angles of bone, which are very thin and pliant: small transverse partitions of bone also lie between these plates at right angles, supporting them, and dividing and augmenting the surfaces for adherence; and towards the lower parts of this apparatus they assume more the appearance of conical cells than plates, and which also are extending to the under surface of this bone, where the diameters of these cells and their depth is much increased, giving it almost a spongy appearance.

That this remarkable part of the bone should be distinguished from the other parts of it, and as this structure appears to have tolerably well defined limits, we have called it the ***Patiloba,**** or *scaly node* of the coffin bone, by which term we can at pleasure separately consider it, and facilitate our views and communications on these subjects, which cannot but essentially benefit our art.

It will be expected that we should say something on the uses of this remarkable and unparalleled structure, being unlike any other bone that we have ever seen, and is probably, at least as to the extent to which it is carried peculiar to the horse, not even extending to the rest of his family ; for, it is to be remarked, that as he is the noblest of his tribe, and that the inferior and meaner members of it have singularly flat-sided hoofs, so they possess also a structure of body in conformity with them ; for the ass could have no occasion for these perfections of the foot if to the body was denied the powers for using them : the fullness of make in the horse, and his superior gracefulness of carriage, requires parts to sustain it, and the foot appears to be made in conformity therefore, with these endowments, by a more elaborate structure.

By this enlargement of the sides of the bone, an unusual extension of surface is obtained, with a stronger hold for the cartilage or reticulum, and at a part of the foot where the hoof, dilating under the weight and impression of the animal, particularly demands yielding combined with strength ; and the lateral parts of the bone being thus formed into thin plates, is also thus rendered in degree elastic, and the cartilage or reticulum being sunk in the interstices of these plates and cells, finds there a secure lodgment from the dangers of rupture or derangement.

The base, or inferior surface of this bone, is considerably concave, and somewhat polished, having slight breaks in its surface and asperities for the more firm adherence of the membranous sole, and

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* From *pateo*, to extend or spread out; and *loba*, lobe.

which is also retained in its situation by the concavity of the bone, and by the deeper cells situated on its sides and extremities, and also by a general membranous connexion enveloping the whole bone.

The posterior view of the coffin bone presents a somewhat semi-lunar figure, and beneath the two articulating surfaces is provided with a broad and very deep, angular excavation, or cavity, to the superior interior part of which, having a roughened surface, the ligament adheres, which retains the shuttle bone in its place; dilating downwards, this cavity next serves to receive the fan-like termination of the perforans tendon, or back sinew; its anterior part also receives the insertion of the tendon of the internal furch, and its superficial extreme margin serves for the more firm attachment of the membranes of the sensitive sole, where they unite to the furch.

The termination of the important back sinew of the leg in this deep recess securely removes it from the danger of contusion and of blows, to which it would be otherwise especially obnoxious on the foot meeting the ground, from irregular bodies strewed in the road; and it is also further defended by the bars or inflexions of the hoof, and more interiorly by the constrated apparatus and stratiform process of the cartilage, and the soft materials of the internal furch and globes also; and finally, as powerfully as by any of these, (when it is duly preserved,) by the soft body of horn of the external furch and its cushion.

Notwithstanding these remarkable provisions and securities, nails lying in the streets and ways often enter the foot of the horse with the most deplorable consequences, directed by the concave of the sole to the side of the furch, they there penetrate, and are then technically termed *kennel nails* by the smiths; and if the tendon gets injured, it is attended, as we have stated, with the most lamentable effects; often a deep abscess forms in the parts we have just described, and the matter forcing its way up the leg, the animal dies a miserable death from pain and irritation.

These cases will generally do well if the horn is thinned in due

time, and a free exit given to the discharges by enlarging the external opening, employing bleeding, and depletory measures, with emollient, soothing, and cooling things to the parts externally.

In desperate and neglected cases, we formerly suggested that a seton might perhaps be employed with good effect, run through the soft posterior parts of the foot, to relieve by its counter impression the more deep-seated parts, and to induce, if possible, the discharges to take that course, (ed. I., p. 118.) And this proposition, only intended in desperate cases, has been, without the least acknowledgment from whence they derived it, used extensively at the Veterinary College under one silly pretence or other, in cases not requiring it, and would have easily been relieved by other measures, and put into the hands of ignorant young men, always too prone to be operating, has been cruelly abused, from being, as they thought, something new and striking. In slight cases, however, an injection of the sulphat of zinc, and a poultice afterwards, with a brisk antiphlogistic general treatment, has been found sufficient to heal the parts so injured, and prevent the fatal termination of these direful accidents.

Of the posterior Appendices of the Coffin Bone. These extremities of the coffin bone in the horse appear, from their peculiarity in structure, and liability to painful disease, to deserve a separate notice and designation, as such will greatly influence and facilitate our views and reasonings in the treatment of these cases. They are extending backwards in a remarkable manner, and give a new feature and power to the horse's foot, filling it up posteriorly, ennobling its appearance every way, and strengthening his tread, giving to it quite a peculiar character, not being found with the cow, or cloven-footed animals, and still less with the digitated. After as much reflexion as we have had time to bestow upon this subject, we apprehend a name as little objectionable as any we can devise; for it is not easy to give a new name that shall be perfectly distinctive, and at the same time classical, short, and of easy pronunciation, and without which they must be rejected. From the phrase or expression, *Ossa retrorsum spec-*

tantia, or *ossa retrorsum*, we shall, by an elision or abbreviation, obtain *retro-ossa*, and *Retrossa*, which will make us *retros* in the singular, and *retrossal*, or *retrosseous*, in the adjective application of it.

Now these *retrossa*, or, if we use other words, posterior appendices of the coffin bone, are evading a too strong pressure by being made of a shelving figure upwards, towards the scutiform process, and also beneath, and interiorly towards the side of the furch. Their very extreme point is vastly rough with knots and excavations, by which the cartilage is strongly held upon them, and the strength of these processes of bone would be greatly diminished if deprived of the scutiform plate of bone rising over them. A large *foramen*, or perforation for the passage of blood-vessels, is seen passing transversely through them; sometimes there are two, and sometimes none, but only a posterior notch. An impressed channel is also seen in the side of the coffin bone for the continuation of these vessels coming through the foramen, which is gradually effaced in approaching the front of the bone. These *retrossa* are very subject to vary in different individuals as to their form, and as to their length and bearing also. In the young animal they are also very short, but extend and grow backwards as the hoof and the age advance, and perhaps are not fully completed in their formation, along with some other late parts, before the eighth year. In the cow, and the other cloven-footed animals, the *retrosseous structure* makes but a mean appearance, or, indeed, does not exist, nor is there with them any scutiform process, which appears to be a necessary adjunct where these parts have an existence.

In the perfectly-natural foot, the *retrossa* are relieved, or raised a little above the general bearing surface of the bone, by which they have a secondary pressure; but after some time shoeing, their lower surfaces, continually fixed on the iron, become more or less flat, or corresponding to the surface on which they are placed.

The *internal retros* is much larger than the external, and is also extending further backwards, in order perhaps to compensate for the

additional weight and pressure which this quarter receives, from its being placed nearer to, and more immediately under the centre of gravity of the trunk, since the whole frame is gravitating between the fore legs. Hence it is so often injured by the smith, if he does not allow it sufficient room, and lays his iron too flatly upon it. If the Retrossa are too flat by nature, or too long, or too prominent downwards, the bruise will take place with the more facility, and especially also if the hoof be thin and weak, or cut away in these parts; they are then opposed, confined, and pinched, or bruised; in the latter case, and blood being extravasated into the horn, it is artfully termed *a Corn* by the smiths, and the understanding is imposed upon by a false term, and even his own views often become bewildered by it. Now the knowledge of these retrossial bruises, their causes and prevention, and the proper treatment of them, is no inconsiderable share of the actual practice of the veterinarian;* for to reform farriery effectually, we must begin by removing her delusive phraseology.

The Retrossa, or posterior appendices of the coffin bone, form a bold feature in the foot of the horse, and appear to give it a more noble character that distinguishes it from all other animals, and is one of the many traits which, in his make and dispositions, are quite peculiar to him, and contribute to his many excellencies. Of their giving an increase of bearing and superior force to the foot, we think there can be no doubt.

On the Bearings of the Coffin Bone. If we place the perfectly-natural coffin bone upon a level, flat board, or table, it will be observed to bear primarily on the quarters, and the inside quarter will take a more decided bearing than the outer; for, as we have before stated, it is larger, longer, and projecting more posteriorly, the causes of which we have also endeavoured to explain. The pince, or front

* The reader is referred, for further particulars, to my Treatise expressly on this complaint and its cure, and of canker. London, 1822. 2nd Edit., pr. 3*s*.

of the bone, will also be found to take hardly any sensible bearing, being slightly turned up, and away from the table, obviously in order that it might more conveniently make the rotation which the foot performs on leaving the ground.

Situation of the Coffin bone in the Hoof. In respect to its situation in the hoof, it is very unequally placed, having its upper surface on a level with the cutigeral concavity; and we may remark, the very anterior summit of this bone is as nearly as possible on a level with the upper edge of the hoof, whilst its basis, or inferior surface, is at a much greater distance, being a full inch from the lower opening of the hoof, or bearing surface upon the ground. The anterior, or front surface of the coffin bone, is ever, in good feet at least, parallel to the front line of the hoof; but when strongly pressed upon by the weight of the animal, is a little diverging at top from this line, through the means of the reticulum, and the other intermediate elastic parts, its posterior parts being then much depressed. In founder, its position is wholly changed; being detached more or less completely, it sinks towards the middle of the hoof, and takes the most depending part.

Of the Coronet Bone. As being connected with the bones of the hoof, and partly immersed in it, we are induced to add its description also to our account of this part. A remarkable trait in its construction is its solidity, having no interior cavity; and when we consider where it is situated, and what it has to perform, we need not be at all surprised at this, since it is receiving alone the whole weight and impulsions of the animal, that nothing less could fortify it for such an office, and against fracture, but such solidity; and even this is not always sufficient, since we see it is sometimes liable to this accident. This bone also is notched out at both ends, having a middle channel in its condyles for the eminences of the bones situated above and below it. And but for the receding properties of the coffin bone, and elastic provisions of the hoof, it would have been much more commonly liable to this disaster.

If we attentively view the inferior condyles of this bone, and especially if we make a vertical section of it near to its side, we shall then see that it is presenting below to the articulating surfaces of the coffin bone, not a rounded, but flattish figure, and is prominent anteriorly and posteriorly, or enlarged to either side. This at first appears a singular formation; but if we consider that by this means the bone, in making its rotation, will for a longer time continue its depressing powers upon the coffin bone, we shall then perhaps discover its true cause; and further, that it will, from this formation, present at all times when at rest a wider range of surface for repose on the bones below upon which it is situated, and especially on the yielding parts of them.

The upper extremity of this bone is considerably enlarged, that it may be brought into conformity with the larger pastern bone above, and bear its pressure without splitting. And this enlargement, for obvious reasons, is particularly applied at the back part of the bone, the pressure being greater in that direction, as may be noticed on viewing the oblique downwards direction of this range of bones in passing to the foot. The posterior part of the socket also is much elevated, or lengthened out, the more to strengthen it posteriorly, and apparently also that it might keep the pressure of the pastern* bone forwards.

Such appear to be the leading principles of construction in the foot of the horse in each separate part, and in the whole combined, as far as our humble reflections and researches have enabled us to consider them. It is these principles, when rightly understood, that

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* From *paturon*, Fr., and *pasturon*, old French. It is also in the old English writers called the *Fetter-lock bone*, as being the part on which the broad ring or shackle was applied when the horse was turned to pasture, and confined by a log, or chain and stake; hence we obtain *fetter-lock joint*, or *fetlock joint*, in modern phrase.

can unfold the obscure and intricate effects of the shoe, and these alone; for the common shoe, from its nature, cannot in any respect participate in these properties of the foot, and hence the cause of its mischievous effects.

And it may be with truth averred, that such is the simple nature of the animal himself, and his disorders, exclusive of the shoeing and its effects, that if these could be removed, there would be little room for the exercise of *knowingness* or trick respecting him by stable-men or others, who fatten upon the miseries themselves have created, by pretended measures for relief, and the changes which this crippled state induces, and the dread which many have, for very good reasons, of using horses, or having to do with them at all, would be in a great degree done away.

We now have to see what will be the effects of turning a bar of iron round to the figure of this elastic foot, and of keeping it nailed, day and night, upon it for a series of years, under the delusive name of *a shoe*.

Gaulter, Printer, Lovell's Court, Paternoster-Row.

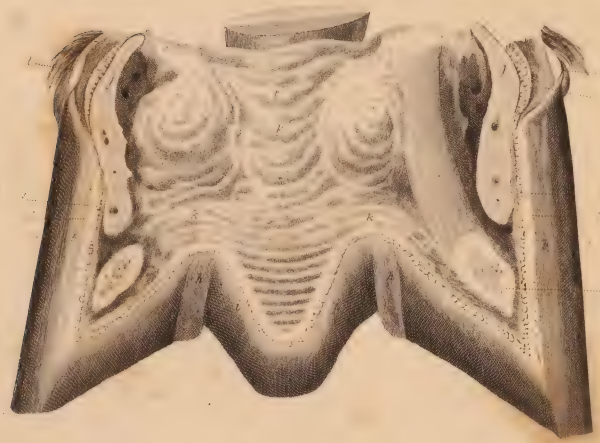

PLATE XII, OR SUPPLEMENTARY PLATE.

FIG. I. represents a sectional slice of the horse's foot longitudinally, and over the commissural ridge of the sole, through one of the podal globes, which is shown by this preparation to be made up, or constituted, of a succession of foliations of thin cartilages, opposed in their direction, and incurvated reciprocally, and thereby forming an irregular sort of flattened globular body lying within the upright lateral cartilages, whose superior incurvation partly covers them over; together they sustain the skin of these posterior parts of the foot, and afford that plump rounded appearance which these parts present exteriorly to the eye.

A dense, stout, glossy membrane connects together these incurvated processes of the podal globes, and envelopes them, and then rising upwards, extends itself over the reflexed upright lateral cartilages, and is also covering them. This membrane has been divided by the knife, between these foliations of cartilage, in order to show their figure more conspicuously, in its being retracted by drying.

Here also is seen in this preparation the part I have called the *Stratiform process*, *c*, which coming from the lateral cartilage, and diminishing as it proceeds to the interior, is passing over the commissural ridge to enter into the cavity of the horn-furch, and there to form its internal capsule, which is invested externally by the *kerapoia*, or secreting membrane of the horn of the furch. Interiorly it is giving out the cartilaginous partitions one above another, which we have called the *substrated layers*, and which are seen more conspicuously in fig. 2.

a, is the *coronet bone: b*, the *coffin bone;* which have been removed to save trouble of representation: *n*, is the *shuttle bone:* on which inferiorly is seen a singular spot of erosion, or ulceration, *h*, which has the appearance of communicating with the anterior surface of the tendon behind it, viz., the *perforans* tendon: This erosion appears to be the effect of a violent pressure upward of the horn-sole against these tender parts especially in motion, causing irritation, and at length, absorption—one of the dire effects of nail shoeing. Though engaged for more than forty years in frequent dissection of these parts, it is the first time that I have met with this singular disease, to which a frequency has been insinuated that is altogether untrue, in order for some sinister purpose, (perhaps to stifle, disguise, and conceal, as it would appear, the general contraction, hardening, and injury to the hoof and whole interior of the foot) in a publication fraught with much disinegnuousness, illiberality, and falsehood; and which, though fully answered and refuted in each separate essay as it appeared, is shamelessly brought again before the public as though intact. This miserable effect of the shoeing was indeed first seen and described by my esteemed friend W. Moorcroft. See *Calcutta Journ.* 1819.

The actual presence of this erosion can only be known by dissection after death, that any predication of it must be little better than charlatanism. Where it is suspected to exist, the removal of all shoeing whatever, the setting the parts at perfect liberty, a run at grass, for at least a twelvemonth, where the refreshing herbage and the cooling sod to the feet, would probably restore the parts to their pristine condition. A horse however under treatment, might be used during the cure, that is, as much as his natural hoof would afford of work, or defended only by leather, or by iron-defended socks, or a paratrite. We are rather led to suspect that it is the hard commissural ridge of the sole that is the offending point chiefly in producing this disease, as being the most prominently opposed to these parts above; on which we propose hereafter further to enlarge in a separate publication. *t*, is a short, broad ligament, lodged in its peculiar recess, and opposite to which the disease also appears to be extending; this ligament is restraining the shuttle bone, and we call it for the present, the *ligamentum nuciferum inferius*, as being connected with the *nut* or *shuttle bone*, in order to distinguish so remarkable a part; *u*, being the *ligamentum nuciferum superius*. This preparation being but a thin slice, gives no appearance hardly of the globular character of the part, or of the limber, gelatinous mass surrounding it, which is nearly lost also by drying.

Fig. II. is a rough sketch of a transverse section posteriorly of the horse's foot, nearly in the course of its axis, and is made to exhibit some of the most interesting particulars of the structure of this organ—especially of the distribution of its complex, cartilaginous machinery.

a, *a*, is the outer hard wall of the hoof: *b*, *b*, the whiter, softer interior of the hoof: *c*, *c*, the *keraphylla* lashing the foot and hoof together, the *podophylla* being enclosed between them. *d*, *d*, *d*, place of the elastic *reticulum*, or web surrounding the bone, and carrying the podophylla: *t*, represents the oval *cartilaginous root*, or *perichondrilla*, or, abbreviated, *perinilla*, which inserted strongly into the skin, produces on its convex, or outer surface, the soft furcaceous horn, forming the *periople*, or furch-band, which covering over defends the line of union of the skin with the hoof, exercising also very many other useful offices, for which see the Hippononia. *z*, is the cutidura anteriorly, firmly connected with the internal concave ring of the hoof, secreting the horn of the wall; posteriorly, loosely connected with the cartilage.

g, *g*, is the horn sole; *h*, *h*, the bars or inflexions; *i*, *i*, the horn furch; *j*, *j*, is the superonuchal portion of the lateral cartilages, formed of a clear, white, crisp cutting, material. Within its reflexed superior portion is seen a hollow cavity, invested sparingly with cellular membrane, which, on admission of air, recedes, leaving a deepish vacuity, a provision, we apprehend, intended to facilitate the circulation of the blood in the foot, when it is forcibly pumped up by the actions of the foot in strong exertions of the animal; thus preventing the rupture of the vessels: for, although a real vacuum could not exist in elastic parts, on account of atmospheric pressure, a tendency to a vacuum can exist and is sufficient for this aid; here the openings of several large vessels, chiefly veins, are also discernible. At *k*, *k*, we see the horizontally directed portion of the cartilage proceeding interiorly from the lateral cartilage, and which we have named the *stratiform process*, very irregular and less uniform in its texture than the crisp, white, upright cartilage, being in some places almost brown, and coriaceous, or leathery, in others radiate and implicate; arriving at the brink of the horn-furch on the dorsum of the ridge, it assumes a more knotted, glittering appearance, and is sending off one, some-times two, ligamento-cartilaginous expansions, which extend over the chasm of the horn-furch; it then descends into it, and lines its whole interior, forming the internal capsule of the furch, having on its outside the *kerapoia*, for forming the horn; it is hardly however a discernible object, like some other important membranes. Manifest papilliform vessels from it however, enter the substance of the horn of the furch, apparently for maintaining its tenacity, and its very ductile consistence, and perhaps also determining its natural thickness.

The interior of this cartilaginous capsule, we see is sending off across the cavity, various horizontal portions or layers of ligamento-cartilage, to form what we have called the *constrated layers*, having between them, jutting out, a white, sometimes yellowish, or sometimes reddish, gelatinous, elastic ligament, mistaken "*for bags of yellow oil*," and affording, perhaps, the most perfectly non-resistant medium that an organised living part can be made to afford, beautifully defending the tender parts above, from accidental contusion.

We next advert to the cartilaginous podal globes, *n*, *n*, which are seen placed on the upper surface of the stratiform, whose plates are concentrically opposed to each other; and are covered over and connected by a dense, glossy membrane, which above connects them with the upright lateral cartilages at *o*, *o*, as stated in fig. 1; and the construction of these globes is also best explained by reference to that figure.

p, *p*, a mass of cellular membrane extremely yielding, soft, and flabby, covering over and protecting the posterior, or flexor tendon, connecting also the elastic globes, it is sometimes forming a plastic mass of considerable thickness over these globes between them and the skin, together affording the handsome mammiform appearance the horse's foot has within the inflexures. *x*, the perforans tendon, singularly made up of two kinds of matter, a white mass in front and yellow posteriorly. *q*, a portion of the interior *retros*, larger than that of the opposite side. For other interesting particulars we must refer the reader to the Hippodonomia.

PODOPHTHORA.

PODOPHTHORA;

OR,

THE DEMONSTRATION OF A PERNICIOUS DEFECT IN THE PRINCIPLE OF THE COMMON SHOE.

The preceding notices of the foot having now placed us in a condition easily to apprehend the results of the following experiments in illustration of the shoeing, previously to entering upon them, we believe it may be well just to remark, that for a period of more than a thousand years has the present mode of shoeing been in use, without the public being at all aware that there was any thing wrong or injurious about it, if it was but properly executed; and though accidents, and unequivocal expressions of suffering accompanied it continually, and were visible to the eye of every one, yet no one ventured to think upon a subject that appeared so abstruse; or if he did, was it likely to be received but with rebuff and insolence: and the mischiefs arising from it were constantly evaded or denied, and were attempted to be overcome in every way but the proper and natural one,—that of *removing the cause*,—which cause also was, to the simple as to the more knowing ones, alike unperceived. And many has been the bribe, bestowed through timid fear and apprehension, to encourage the workman "*to shoe his horse well*," without the donor at all entertaining any fixed notion of what that "good shoeing" should consist in; for it is lamentably true that the mere labourer in any art may practice it all his life long, and that for centuries he may exercise it without his once entering a single step into

its principles: a bricklayer, for instance, may lay bricks to the day of his death, and his successors in like manner, without ever in the least comprehending one single principle of architecture; but that the events which daily occurred in this art did not awaken men to a sense of something being fundamentally wrong in all this time, is a most surprising fact. For, as we have said, a thousand years have passed over without the true principles of the art being at all discovered, or that there was a gross defect in the very fundamental part of it, and which had been a source of animal suffering and misery, that certainly has no parallel in the world! And it was quite unlikely also any remedy should be found out, whilst the true cause of the evil remained undetected.

For let whatever will be said about these effects being known of the shoe, it is clear, from the readiness with which people consent to have their horses shod at any age, on the first summons of the breaker-in of the horse, that they view the shoe merely as protecting the foot, and are not aware of its insidious effects; nor do they afterwards exhibit the least jealousy or anxiety about it, but would rather, as we often observe, treat the proposition of its removal as a piece of inhumanity.

If what we have stated respecting the nature of the horse's foot be true, the effect of the shoe will be almost presumed without any demonstrative evidence; but as reasoning may easily err, and imagination lead us astray, still the actual experiment, if truly related, will ever stand as plain matter of fact, that can neither err nor be denied; and the course of the experiment will also unfold a variety of matter for reflection respecting the foot, which would not properly attach to any thing we have heretofore noticed. We proceed, therefore, to the consideration of this first experiment on the effects of the shoe, in which the public, as far as they are interested in this important inquiry, and especially myself, are greatly indebted to the obliging conduct of George Hobson, Esq., both in providing the subject, and in allowing the mare on all proper occasions to be brought for exami-

nation, and the prosecution of these experiments; for next in every state to man himself in public utility will be what respects the services and true knowledge of this animal, and how we can best obtain those services, and prolong the period of them.

The assertion, at first, may appear singular to those who have not investigated these matters with a close attention, or viewed the chain of connexion of these things from the beginning of the services of the animal to his final termination at the slaughter-house, through the different periods of his rapidly-destructive course; but is nevertheless true, that the shoeing it is, with its multifarious train of consequences, that for the most part has been the root of so many evils to the horse and to mankind, not only by its immediate operation on the structure of the foot, but by its entailed consequences in the use of him, which is so often rendered unsatisfactory, vexatious, and dangerous through it: and these errors, we may observe, in the management of the feet, are ever visited with unmerited punishment upon the animal himself, in order to do away, if possible, or overcome its effects, by exciting other feelings, though for the most part in vain; and it is principally from this also, that the vehicles for draught are filled with all our best saddle horses, as they cannot longer ride them on account of this tenderness of the feet, and by which, after a most painful and miserable existence, they terminate their lives at a comparatively early stage, often before the half of their natural term is expended, and with an immense loss to the public, setting aside all considerations of humanity, which, for certain reasons, we purposely exclude from this part of our labours.

No inquiry respecting shoeing would at all be necessary if our horses invariably went well, and with a firm and proper step; but the case being remarkably otherwise, an inquiry becomes necessary into the cause of this general defect, that the real cause of the evil being understood, the proper remedy may be sought out.

By many it would be naturally expected, that from Newmarket, where wealth, learning often, and horses, go hand in hand, would proceed

the best intelligence on these subjects; but not one ray of light has ever yet emanated from this school; but we hope, now the barrier is broken down that impeded the course to this knowledge, prospects may brighten, and it may become more productive in this respect. For it is indeed but too true, that knowledge in these affairs is not to be attained by stable cant, or "the motley phrase that defies the matter," but by patient research and labour, as it is in all the other arts and sciences, and by which alone these difficulties and obscurities can be removed. We believe the present jockey-system of knowledge respecting these animals must greatly change before a true system for obtaining the utmost speed of the horse can be attained; and this, we apprehend, will one day be done without the extreme distress that now accompanies it; and certainly great advantages and perfections may be derived at present from the elucidations respecting their feet, already given, and this art is likely soon to become an art that all may understand, in principle and practice.*

We now propose to enter upon the details of this important experiment, by which the nature of shoeing can be illustrated; and for this purpose refer the reader back to pages 20 and 21 for what has been already given respecting it; where it was stated, that a beau-

* And one thing, we think, is very certain, which is, that their *plate shoe*, as they call it, is not the shoe for a race-horse to do his best in, but has many disadvantages when all the circumstances of the case are taken into consideration, and is an especial folly in wet weather, or where the turf is deep and spungy, and a very uneasy shoe at all times. In pursuing lightness they have lost sight, or not known, other circumstances necessary in a well reasoned horse-shoe for this purpose, that is, taking into view all the circumstances of the case. And as to reasoning, we may plainly see that nothing of the kind has ever been employed upon it, or could have been, under nearly a state of total ignorance of every circumstance attending the question. Extent of surface in the shoe (cover, as it is mistakenly termed) is an unquestionable advantage carried to a certain extent, not only by presenting more bearing surface, but by not sinking in too much: but without much enlarging here on the advantages of this extension of bearing surface, we may refer the reader to the reasoning used in the figure given to the Expansion shoe.—*Description of the Expansion Shoe, 2nd Edit. London*, 1827.

tiful young blood mare, the property of George Hobson, Esq., of Harley Street, Cavendish Square, was sent to my forge to be shod; and this circumstance, I may here observe, happened to take place in a most extraordinary manner, about a week or ten days after my mind had been strongly impressed that it was the shoe itself that occasioned so much mischief, from the nails sticking fast in the iron, and too strongly girting the hoof; and it also occurred shortly after that the truth or falsity of this opinion could be rendered experimentally demonstrable, if a fit subject could be found with a tolerably good natural foot; when in the remarkable manner above-mentioned was presented this mare; for right well I knew the obloquy that would attend the giving forth such an opinion or assertion as this, if the proof were wanting to support it, and that it would most probably do harm also instead of good to the cause it was meant to advance, the cause of this worthy animal, and of that truth that is his right; but which opinion, if established, must one day infallibly produce a great revolution in the practice of shoeing, and lead also to an amelioration of the general treatment of the animal.

In the former edition, the matter of this experiment was often interrupted to bring in details respecting the foot: in this edition these will be nearly excluded, which we hope may contribute to give a greater force to the circumstances of the experiment.

A twelvemonth having elapsed from the taking of the first cast or impression, I was desirous of seeing what change had been effected by these iron measures, and proceeded, June 13, 1805, to take a second cast, being exactly a year and nine days after the application of the shoe. During the whole of this period the shoeing smiths, who were as steady men to the full as any others in their line of employ, were left to the practice of their own art without the smallest interference or controul on my part. They were aware of the cast being taken from the foot, and were not less careful on that account in their attentions in shoeing her. And in *plate* 8 is seen a representation by the same eminent artist, Thomas Milton, (grand-

child of our noble Poet's brother,) of the second cast from the foot of this mare.

Let us now mark with precision the differences that have taken place, and see what have been the effects of fixing the foot without intermission, for a period of twelve months, to an inflexible iron ring, for such is briefly the fact with respect to the nature of the shoe, by whatever name it may be called; for the word *shoe* has also had its fascination in concealing its effects, by bringing to our view the comforts we derive from our own shoes made of leather, and elastic to the foot, to which, neither in the material of which it is made, or in the mode of its application, has it the smallest correspondence; of such force are names that mere chance often confers on things in blinding our views of their actual nature.

The original state and proportions of the foot being before us, and perfectly preserved (*vide Frontispiece*, or *Pl.* 1,) we are enabled to make an exact comparison of its former and present condition; a diminution of volume throughout is strikingly manifest, but more so in the elastic parts. A mechanical hardness marks the appearance of it, in place of the flowing, easy outlines observable in the original. The evident competency of the parts to their respective offices, which the eye recognizes in the former, is done away in this; and such is the general diminution of the foot, that actual lameness would naturally be supposed the effect of so much alteration unless explained; for this does not take place for the following reasons; that the parts have suffered their alterations slowly, and, from being in their nature yielding and elastic, have given way to the effect of the shoe, as far as the diminution extends at present, without much resistance; and above all, that during the application of the shoe, the parts that have most suffered are not called into action, nor are their uses required, so that the foot by degrees assumes a new sort of existence, and gradually adapts itself, as much as a living part can do, to the effects of the iron circle, and cannot afterwards well do without it.

We now examine the nature and extent of these changes wrought

FIG II.

THE SAME FOOT AFTER PARING, AND HIS SHOEING.

by the shoe; first observing, that in our drawing away this second impression, we were surprised to find with how much greater force it was held and came away from the foot than the former cast did, and as immediately appeared from certain alterations that had taken place in the relative situation of the parts of the foot, as the slanting surfaces of the bars and frog had now assumed a more perpendicular direction.

The furch bulbs, *a* and *b*, suffering with the furch, have lost their noble, swelling, rounded, figure and appearance, and the surface they now are seen to present is an ugly, flat slope, towards the base or cleft of this organ. And this has not been the effect altogether of the compressing power of the shoe, but has been occasioned by the senseless cuttings and carvings of the knives of the smiths. And though the representation in the plate does not reach it, it is probably accompanied also with a withering and diminution of the internal bulbs or resilient globes, from the compression of the cartilages, and by condensation or absorption, or both.

The extent or space between the inflexural columns, from one to the other, was, in the original state of the foot, somewhat more than four inches; in the second cast it measured scarcely three. The foot across its widest part, viz., at its greatest swell at the quarters, measured in the original cast nearly five inches and a half; in the second cast, only four inches and seven eighths. The actual length of the foot, we may remark, is not materially changed, which seems to confirm the circumstance, that the cause operating these effects had been lateral principally, and consequently serves to evince its having been chiefly the effect of the nails.

The furch had lost, through its being wasted by compression, and the cuttings of the smiths, the rounded useful swelling and projection we had distinguished by the name of *the Cushion;* and although its substance was so much diminished, still its lower surface was lower by nearly one fourth of an inch than the inflexural columns or wall; for it may be recollected in the account we gave of the furch under

the chapter on Frog-pressure, that this part was then three eighths of an inch higher, or within this level. The sole appeared somewhat more arched or cupped than formerly, but the degree of thickening it had undergone, as also the elasticity it had lost, could not be accurately ascertained in the living subject.

Thus we see the beautiful and useful symmetry of nature's mould, no part of which is without its use, has been changed by artificial restraint to deformity and incompetence. Many there are who have contributed unnecessarily to the obscurity of these cases by confounding them with, or supposing them the effects of standing in the stable, which has served to blind their eyes to the effects of the shoe, and on which account, in a future page, to set things in a more clear light, we shall give proof enough from actual experiment, that however inimical to the feet the stable may be, it is wholly incapable of producing such powerful effects as these, which can be shown most convincingly in two ways, viz., by shoeing, and turning the horse to grass, when the same effects will ensue; and also by keeping a horse unshod in the stable, which we have for years done, when no effects of this kind have taken place. The worst cases of contraction also, we may observe, are with stage horses that have but little opportunity, unfortunately for them, of standing in the stable, being almost continually on the road.

Also our views formerly, on observing these obviously-glaring cases of contraction, were used to be confined to the heels only, and the mischief was attributed, as we have stated, to some natural deficiency of the foot, to *bad shoeing*, as it was called, to bevelling the heels of the shoe too much, or to the want of pressure on the frog, or other causes of this sort; and immediately followed propositions for the futile task of expanding the heels again by frog-pressure, without in the least guessing at the source of the evil; and, with the same intention, the smiths would have recourse to cutting away the arch of the commissure, expecting, vainly enough, that the heels would then *fly* open! but which drying, contracting, and often cracking, served only

to increase the mischief,—the attempt at expanding feet so contracted having cost us more attention and expense than almost any other part of our studies and labours respecting the horse, we shall give the general result of them on some future occasion. Indeed it was in making those fruitless attempts that we were first led to see the true nature of the evil; for it is singular, that those views of contracted heels were not at all accompanied with any right apprehension of the true cause and origin of the mischief; that it is very possible to see without perceiving things most obvious, and to perceive and yet not fully understand; so difficult is it to overcome preconceived notions which we doubt not the truth of, or entertain that which our suspicions are not awakened to; and obscure and repulsive are the paths which lead to light.

Seen by itself, there are many now who would deny there was any contraction at all in the foot, *tab.* 8; and more would say it was not of the smallest consequence, because they had been used to see feet much more contracted; and as far as it extends at present, it will not be so much felt as to be made sensible, by external indications at least, while the shoe is used, the animal being patient and courageous in bearing any necessary pain. But that a defect, of an injurious nature to the foot, exists, can be proved even here; for by experiments in similar cases we have found, that by taking off the shoe, and using the foot only a few miles on the road, it will acquire considerable heat, and be inflamed in a way that would not, in the smallest degree, have taken place in the natural foot; and arising, as appears, from a deficiency of the elastic parts of the foot, which by pressure, or want of use, or both, have been condensed or absorbed, and their uses being again called for in this experiment, for the well-being and ease of the foot, painful sensations and inflammation are created by the want of them. For it is not from external resistance, as would at first appear, that this pain arises, for this resistance, it is evident, will be more complete when the shoe is on the foot, but from

efforts at expansion of the different parts of the hoof, which the loss of the elastic parts does not permit.

Five years of unrestrained growth have perfected this foot beyond what is generally seen at the commencement of shoeing, which usually takes place on the second, third, or fourth year of the horse, and before the foot is nearly unfolded or grown to its size; so that the great change that is here observable is more strongly manifested than it would be in ordinary cases of shoeing; and the foot cannot be expected to exhibit differences so great and conspicuous in succeeding years as in the first, there being less of elastic matter to act upon. Nevertheless every year will have its effects, and will bring the hoof in closer approximation to the coffin-bone; and at length we shall see that a partial diminution of the bone itself will be the consequence, with other derangements of its accompanying parts.

The horse, we may remark, like other large animals, is slow in acquiring maturity, and, like them, is not very short-lived. Some celebrated writers have considered the natural period of his life about fifty years. This was before the art of shoeing commenced, and may be not far from the truth in those times. If we were to give an opinion on this matter, we should state it as our belief, that he acquires his *stature or height* at about *five* years, but obtains his full bulk and strength about the *eighth* year; and this period, as in most other animals, if multiplied by four, will give somewhere about the period of his natural life; which, without any desire of unnaturally extending, would be from thirty-two to forty;* and at the former age we have seen (setting aside the state of his feet) horses capable

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* Vivunt annis quidem quinquagenis: feminæ minori spatio.—*Plin.* lib. 8, c. 42. Gignunt annis ad quadragesimum.—*Plin.*

There is a cart-horse on the canal, near Warrington, 63 years old, to be seen at the Bear in Lutford.—*Liverpool Advertiser.* Also a hunter near Amersham, in Buckinghamshire, 52 years old, that was never out of the gentleman's hands who bred him.

of a great deal of service. But what we wish to remark is, that frequent visits to the slaughter-house, a useful school, but not much frequented, have led us to observe and conclude, that six arrive there before, to one after the fourteenth year! for they so early become cripples through the injuries of their feet, that it is found most advantageous to the interests of those who get these kind of horses that are daily becoming tenderer, to "use them up" by the severest measures, and most unnatural usage, rather than to endeavour to prolong their labours by preserving them; and there is no want of supply through the causes above described, at least principally; and it deserves a closer attention from the public than it has ever yet received; for men, as we have before observed, have been really afraid to look into these things about horses, as though their affairs were somehow clothed in fearful and impenetrable mysteries.

Let us now quit these considerations for a more close view of the nature of the shoe, and how it produces these effects.

The first and most obvious evil of it will be its permanent application and constant pressure against the bottom of the foot, with a force altogether indefinite, depending on the strength with which the nails are clenched, and the proximity of the shoe to the sole, which causes it to act with more or less violence against the lower surface of the coffin bone. Next, the nails in the sides of the hoof, being immoveably blocked in the perforations of the shoe, create a solid resistance of iron at this part, not admitting the natural expansion of the hoof; and it must be obvious that they almost, though not entirely, prevent, by keeping the quarters fixed, every movement of the posterior parts and heels. To obviate this, the nails have been placed as much as may be in the front parts of the foot and shoe, though in reality it was not so much the intention of those who recommended this mode of shoeing, to remove the nails from those parts on this account, as from their being occupied with the mistaken idea of the necessity of pressure on the frog; and to obtain this, the shoe was directed to be made very thin or low at the *heels*, (as in the

shoes of Lafosse and Coleman,) that by the ground meeting the frog, it might force open and expand the *heels;* and the nails were in reality not inserted in the posterior parts of the foot, in order to give an opportunity for this apprehended operation of the frog. In examining the structure and relative situation of the frog, we have seen how little probability there is, that this softer and more retiring part of the foot could be designed by nature for any such office; much less then could it operate with any effect after the nails had in any manner restrained the natural movement and dilatation of the wall. Indeed, the want of success attending all attempts to bring this shoe into actual practice formerly, as well as in these days, sufficiently shows that the doctrine was unsound, though where the defect lay did not before clearly appear.

The feet of horses that have been shod with the low-heeled shoe, we have remarked, have been kept very open by it; yet those who have used it have after a while almost universally abandoned it, preferring the usual methods of shoeing with a level or thick-heeled shoe, nailed along the sides of the foot. This change, we apprehend, they were induced to make from experiencing a degree of sensation and tenderness after much exercise with this sort of shoe; proceeding, perhaps, as might indeed be expected, from the unequal bearing and pressure on the posterior parts of the foot, which such a shoe would inevitably occasion, and also from the strain and distension which the back sinews would suffer from a shoe lowered at the heels; for in order to be indulgent, it ought rather to be raised than lowered, as is the case with our own shoes, the heels of which are always made thicker than any other part, and for the same obvious reason. For with calkins I observe horses almost invariably go the best; and which I was led into the discovery of by turning them up for frost, having been before rather prejudiced against it.

Though subject to the inconveniences above mentioned, a thin-heeled shoe will be perhaps the least injurious to the structure of the horse's foot of any of the rigid nailed shoes; and if applied or adopted

with more correct views than those of producing pressure on the frog, it might perhaps be rendered much more useful than it has ever heretofore been; and particularly to young and growing feet, where it may be resorted to with obvious advantage, if no better means for protecting the foot can be devised.*

Nor are we disposed to attribute the open condition of the foot when this sort of shoe is used, to pressure on the frog; the cause usually assigned, except in a very subordinate degree: we should rather consider it as arising from the opportunity which this sort of shoe affords to the oblique surface of the bars themselves to come in contact with the ground: these, by their structure and direction, sloping downwards and outwards, present interiorly a more solid and proper surface to the ground than the frog, for dilating the posterior parts of the foot. The frog, it will be obvious, also contributes its share, though in an inferior degree, admitting rather of these move-

* To make this sort of shoe answer best the purposes designed, we apprehend it should be made of steel properly tempered, and not of iron, as it may thus be made thinner and lighter, and be even more durable than with iron: it also might, from its thinness, be in part or wholly let into the hoof in front, so as not to disturb the natural course of bearing of the foot on the ground. And as to Lafosse, and all those who followed his frog-squeezing notions, they never arrived beyond this idea, that as the foot was contracted, and apprehending that it proceeded from want of pressure on the frog, they thought that it was necessary to use as much pressure on the frog as possible to prevent it; and the shoe was lowered at the heels for this purpose, that it might operate the better in letting this pressure take place: and it is singular, that satisfied and absorbed in this apprehension of their's, they were never carried to the true source of the evil, nor did this apprehension lead them to a knowledge of the elastic actions or expansive properties of the foot, which is quite a different view of the subject, and leads to different results in the shoeing, viz., to a shoe with a motion, or a removeable shoe, the one which is necessary to the latter doctrine, but which never did in any instance occur to Lafosse, or any of his followers, under the former impressions, proof enough of the difference which, when known and fully understood, to some may appear but small; yet the want of that little difference has been the cause of unspeakable torment to the horses. And the mischief to the horses and to the public that these colleges, as they are called, have done in reviving this stupid old doctrine of Lafosse, is almost incalculable: wherever I go, I still see its abominable effects.

ments than producing them; for we must not be misled by the appearance which this part makes in shod feet, as it always hangs considerably lower than it will be found to do in the full-formed good natural foot. But the preservation of the form of the foot by this kind of shoe, is to be attributed more than to either of these causes, to the almost perfect liberty in which the quarters or sides of the foot are left by the non-insertion of nails into them; the weight of the body then maintaining the movement of the hoof, which will preserve entire the figure of the foot.

This discussion on the shoe is rather a digression from the object of our present inquiry; belonging chiefly to a subsequent chapter of this work, where we shall consider the different shoes, and the reasons of their preference: here we propose alone to consider the cause of the mischievous effects of the shoe.

The nails driven by violent hammering into the square perforations of the shoe, are lodged therein so firmly as to form with it a solid mass, wholly preventing any movement of the hoof at the parts where they enter, and at some distance from them; the quarters being held in this fixed state, the rest of the hoof is also robbed of that motion which is necessary for the healthy existence of the foot: being thus held for months, and even years, in a constrained state, it becomes stiff and inelastic, then diminishes in size, and a train of effects ensue which we shall more fully consider hereafter.

This elastic movement and dilatation of the hoof will admit of being not inaptly exhibited by comparison with the ordinary movements of A BOW for shooting arrows, having under the weight of the animal an evident motion of this kind. Bows also are brought, we believe, from the eastern parts of the world, which are occasionally seen in the museums of the curious, and whose ends or extremities are inflected, or turned inwards towards the centre of the bow, and afford a further illustration of the structure of the wall of the horse's hoof. It is clear also, that if a bow be firmly confined at one or more points along its extremities, it will lose the power of motion,

and become more or less perfectly fixed, as these points are more numerous, or are placed at a greater distance from the centre of the bow. And the nails, by passing through a perfectly inflexible iron ring into the hoof, will make the hoof as inflexible as itself, accompanied with different degrees of restraint, according to the size and figure given to the shoe, or the size of the nails, and the direction which they may have taken in passing through it; which, depending entirely on the judgment of the workman, or rather his simple apprehension, totally unaware as he is of the structure and properties of the organ he is fettering, will be ever liable to great uncertainty and abuse. Nor is he aware, as he adds nail to nail, with violent hammering and clenching, that when he has driven the last, he has circumvented the hoof with a perfectly inelastic barrier of iron, destroying almost entirely any motion it has, for one part cannot well move but in conjunction with the rest; and thus is produced the first part of the evils of shoeing.

The manner of paring the foot, and of bevilling interiorly the upper surface of the shoe, will bring the exterior edge or circumference of the hoof to bear alone against the shoe, and on which the whole weight of the animal will rest, instead of being distributed over a more general bearing. This seems an unavoidable defect in all shoeing of this nature, and which cannot be wholly removed; and this mode of bearing will sometimes occasion, and especially if the hoof be not very strong, a bending in near its middle region, and in other feet producing a contraction of the hoof about the coronet, attended with a miserable feeling, tenderness, and often lameness, and which the French term, *Le pied encastelé*, and for which the English, that I know of, have no proper term. The natural bearing of the hoof on the ground is a very broad and extensive one, embracing several parts of the hoof, and is quite different to this.

Horses also about to be shod are usually led from the dry stable, and in the most dry and hardened state of the foot have the iron applied to them, which cannot afterwards in the least relax. And it

is also true that the shoe is affixed to the foot whilst the foot is off the ground, and free from any weight or pressure, and consequently in its least extended state—a circumstance which greatly tends to augment the evil, and accelerate the contraction.

Nor should it be forgotten, that the nails when driven into the substance of the wall, distend it, like wedges driven into wood.—For it is obvious, that they will always remove a portion of horn from its situation equal in size to the bulk of the nail, the impression of which will be partly lost by condensation of the horn immediately surrounding it, and partly by the dilatation of its substance; which dilatation will take place chiefly towards the inside of the hoof, the horn being more soft and less resisting than on the outside: it is true, this effect of the nail where the hoof is large, as in feet that have not been much diminished or impaired by shoeing, as in the fresh feet of young horses, will not be much felt; but where the hoof by contraction has got into closer approximation to the coffin bone, or in feet that have been trimmed pretty close, or pared small for neatness, or to prevent cutting, or where the hoof has been broken, and there is a necessity for nailing to the broken part, then it will be severely felt, and produce various degrees of compression and tender feeling.

There is in these cases no yielding or power of adaptation in the iron to the foot; that if the shoe be irregular or deformed, it will always draw the horn after it; and if the nail, in being driven by the smith, should bend in its passage through the hoof, which it is very liable to, it will have the effect of compressing the foot. On examining horses' hoofs after death, we have frequently observed ribs of horn running in a perpendicular direction, and bulging towards the inside of the hoof, the obvious effects of nails that had been driven too close, or had bent in their passage: an inconvenience which at times cannot be prevented even by real skill and care.

Again, after the hoof has been pared so as to satisfy the smith, we generally see him make the shoe somewhat less; and after it has

been nailed on, the projecting horn is rasped, or cut away with the knife. This, it has been said, is done to prevent the foot being too large, to prevent cutting, or for neatness: and most certainly it will but too frequently bring a compression to the interior more than it ought to be; and as to the cutting, we have been well satisfied it has on most occasions proceeded from the benumbed state of the foot more than from the size of the shoe, of which we shall give some striking proofs hereafter. And as a further abuse, we may observe, that it frequently happens after the first nail has been driven, that the shoe is violently hammered on the side to bring it into its proper place, and thus compression is conveyed to the foot, and the fine edge of the coffin bone gets damaged—that this evil should also as much as possible be avoided.

Another circumstance unfavourable in the use of the common shoe is, the constant advance of the hoof forward by its growth, by which the narrower parts of the shoe are carried forwards to the wider parts of the foot, and create a degree of compression at these parts: and at times we even see the shoe buried in the horn of the hoof which hangs over it, exhibiting plainly the compression that attends it, for the narrower parts of the shoe are now opposite the wider parts of the hoof.

It is also a truth that cannot be denied, that by shoeing the tender feet of the young and growing horse, which are then enlarging to their form with the other parts of the body, not only the evils arise that would occur to a full-grown foot if shod, but there is a partial arrestation of the growth attends it, with frequent disfiguration also; so that whilst their limbs and body are every where increasing in bulk and weight, their feet, placed in bonds of iron, are diminishing in size and fitness to support and move them.

It is a circumstance certainly of less moment than some of the preceding, although not to be passed over in silence, that the foot, with the shoe placed upon it after the usual custom, is much longer at the toe than the natural foot, creating an unnecessary purchase on

the back sinew, which will tend to embarrass the movements, and strain and fatigue the limb; for if we attend to the natural hoof, it will be found that this wearing extremity of the hoof on the outside of the toe is short and removed, forming an obtuse, broad, blunt surface, that can occasion no impression or strain on the limb: the shoe, it is true, will, when nearly worn out, assume this figure in some degree; but we propose that it should possess it on its first application. This suggestion, however, we leave to be determined by future experience.

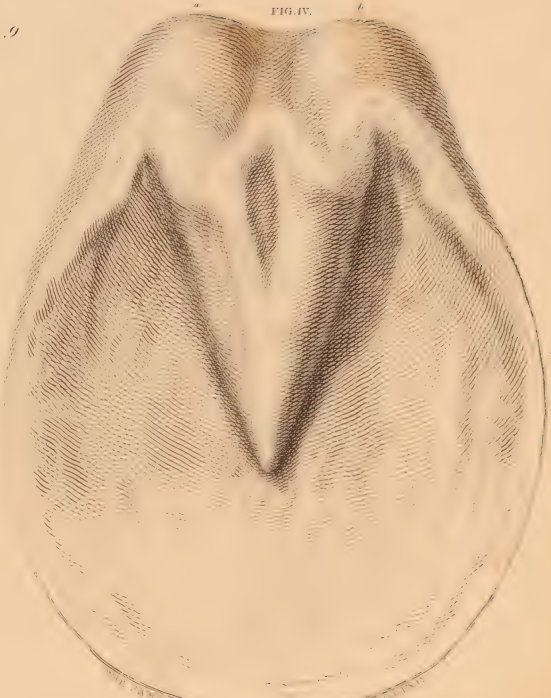
It is also serious matter of regret, that not only the principle of the art is defective, and especially obnoxious to the young and growing feet, but unfortunately the practice of the art is peculiarly exposed to abuse and accident: being a laborious employment, it is necessarily occupied by men of little or no education, who after a short time become strongly prejudiced with the powers of their art, and their own super-mysterious skill, and, getting into difficulties, commit errors from misconception and a defective knowledge, that makes the practice as much, or more destructive than the principle. A brief enumeration of some of these errors may not be without its use: and preceding writers have inveighed bitterly against the practice of *burning the feet*, and formerly, perhaps, with justice; but at the present time we do not recollect to have seen much mischief from this source; and we should apprehend that the evils they experienced, and conceived as arising from this cause, should have been more justly referred to the general principle: in cart-horses, where the growth has been considerable, it saves much trouble to burn away the superfluous horn, though an unsightly, and somewhat dangerous practice; with nag horses it should never be at all permitted. More frequent injury arises from clumsy and ill-fitted shoes, or shoes made too straight on the sides, or with irregularities and roughness, or pritchel burs, raised in making the holes on their upper bearing surface, that in tender feet may come in contact with the circumference of the sole, or rather that part the smiths call the

Pl. 9

FIG. III.

THE SAME FOOT AFTER TWO YEARS SHOEING.

FIG. IV.



THE SAME FOOT AFTER THREE YEARS SHOEING.

Sydm Edwards Del

vein, a more tender vascular part circumscribing the sole. But the most frequent evil of all is from pricks or stabs of the nails, by their taking a wrong direction; or from the nails, too large, compressing the foot, splitting and tearing the hoof, admitting air into its substance, and drying it. Rasping away the useful cuticular covering of the hoof, we have also already spoken of as an ordinary error, and should not be permitted: and of the ill effects of slicing the frog, and other injurious practices, we have already given our sentiments, and which, as they do not attach necessarily to the principle, may all be removed.

We shall now quit these considerations, to contemplate the effects of the second year's operation of the shoe, which is exhibited in *Plate* 9, *fig.* 3, engraved also from the actual cast of the foot by the same excellent artist. The stiffness and increasing rigidity of the hoof is more strongly manifested than in the last year; the quarters are more straitened, and a further reduction of its bulk of near half an inch has taken place. The cleft of the furch has become narrower and more lengthened; the foot has run out or lengthened at the pince, as though this part, from having no restraint, had increased at the expense, as it were, of the diminishing quarters and heels, being carried out further in extent before the point of the furch. When an impression of the foot was taken, it was always done on the removal of the shoe, and before the foot was pared, that it might appear as natural as possible, and not narrower than was real. And most certain it is, that now the foot can less perfectly serve the designs which a kind Providence proposed in its construction; for where no superfluous or unnecessary part had been given, nothing, it is obvious, could be changed or taken away without some prejudicial effect.

If the hoof be contracted in its diameter, or has become of less area, the softer parts within will be brought into closer contact, or

be absorbed, which condensation, or loss, must be followed by sensations to the animal which it would be difficult to define or ascertain; we should, however, be reasonably led to expect a degree of numbness from the compression, attended with faintness, or a dull, aching pain. An impeded circulation of the foot will be one of the obvious consequences; and whether the elastic processes are not injured by being compressed from a diminished area of the hoof, is not easily ascertained: in very old cases we have thought them paler than the natural ones, and not so broad. That this compression in the latter stages of shoeing is attended with severe suffering (whatever may be the degree of feeling in this stage of the business) is certain, since neither the spur or whip, however severely inflicted, will make the animal for many minutes together put out and use his feet to the full extent of their natural action, or set them fairly to the ground.

If now any thing unsafe or disagreeable begins to be experienced, the rider will be led to suspect that idleness or carelessness is the cause, or weakness of the limbs, or, which is as usual, that the horse is somehow *not well shod;* and finding that chastisement does not long avail, or prevent him from tripping and being tender, and unacquainted with the actual changes which have been going on in the feet, and considering the shoe as a natural and beneficial defence, and not aware of its defective principle, he will attribute his difficulties to a variety of causes, neither of which may be the true one; he may become desirous of investigating and obtaining a knowledge of the shoeing art; its abuses and errors will strongly arrest his attention, nor will the slow and invisible operation of the shoe upon the foot probably become a matter of his observation: seeking information from the grooms, he will perhaps be first recommended to try *good shoeing*, and to have recourse to some more knowing limb of the business, who, "*from practising shoeing all his life, must know the thing well,*" and who will be expected, by some cunning trick or device, to rescue him from his difficulties; but in this he may also be grievously disappointed: harness will probably be recommended to

him as the next resource, and a proper vehicle being provided, his tenderness will be surpassed by measures I shall not here describe; and girded to the bearing rein, and sharply bitted, he is compelled at all events, to perform his allotted work.

Some deviations or exceptions from the general rule. As it is a fact that all horses do not suffer alike, and which has tended greatly to embarrass reasoning, and conceal these effects, so we may state that in horses, where the foot is large, coarse, and the horn very strong, it is not so very much perceived, and the contracting process may go on yet further, and not be much felt, especially by a rider that has been long accustomed to this malady, or has had more tender subjects to deal with; or if his hand and seat be not very sensible to what is passing under him, in which respect there is a surprising difference amongst men; or by assiduous attention to the animal and the ground he passes over, its inconvenience may pass almost disregarded. Also the natural courage of the animal in bearing pain, and which has been slowly induced, and to which he has become accustomed—the fear of punishment—the rewards of delicious food looked for at the end of his labours,—will also all tend to make it the less perceived, and the pride of not admitting a defect shall occasion even the existence of it to be denied where it is obvious.—On the other hand, if the hoof be small, and closely embracing the foot,—the horn thin or very hard, as is particularly the case with blood horses, and if the shoe has been applied early in life, then the evil will be operating in its greatest severity, and at a very early age he becomes a cripple, and is brought to the destructive measures we have mentioned. At five, and even four years old, I have frequently seen horses from this cause incapable of taking more than half steps, and going in the greatest pain and misery, and with difficulty kept on their legs: in tripping he perhaps falls, when it is quaintly said by the grooms that "he has *thrown* his horse down;" or, as sometimes happens, he falls with the groom himself—and then he is "a poor tumble-down devil, not fit to ride;" and

then, " What a shameful thing it is to put a poor fellow on such a *dog-horse*"—that " he is only fit for harness, or in reality the dogs," or that a rolling-stone had caused his fall—though perhaps just before purchased at a high price, and by his own recommendation.—Or still another course of events may occur, and such an accident as the above may have been brought on suddenly by a tight shoe, or a nail driven too close; he may fall in consequence, and be sold on this account: the nail removed, and a shoe better fitted, shall relieve him, and he may pursue the ordinary course of other horses for several years without a similar accident.—Such casual circumstances tend to obscure and embarrass what otherwise would have been almost natural and easy inferences in respect to the feet and shoeing,

Or it may happen in these cases where complaint is made of bad going and tenderness, that the smith will have recourse to the only, or almost only resource he has for giving relief; and this is the operation which he is pleased to call " *throwing open the heels,*" a phrase which mightily fascinates, since it is the very thing that is wanted. For though the expression itself is a mere delusion, yet relief is often obtained by the measure; for it will be clear on inspection, that the heels are not wider after the operation than before, nor are in the way to become so, but a fallacious appearance of width is communicated by the divided parts appearing at a greater distance. This operation, and what we apprehend is the real cause of its relief, is of sufficient importance to deserve a particular description: it is thus performed:

We may observe that the wall of the horse's hoof, at its inflexure or posterior extremity, is projecting to a sharp solid edge or angle of horn, which is turned inwards towards the frog; and in the collapsed or contracted state of the foot, this part resting against the side of the base of the frog, is compressing and almost cutting it: this sharp angle of horn is removed by a slice of the buttress, and, by a second cut, a piece is also removed from the base of the frog, leaving a deep wide notch in these parts; and it is usual to see a deep incision made

into the thick bulbous covering which the frog sends over the inflexural column at its upper part. After this, the sides and bottom of the reverted arch of the frog are most unmercifully sliced away, and without any just reason whatever, as we have before shown in our account of these parts. Indeed the hard horn of the bar might be better spared, as it is the encroaching part, than the soft and more necessary horn of the frog:—next, the sole is miserably thinned with the drawing knife.—And now the effect of all this cutting away is, that the foot is not actually wider than it was before, or likely by these measures to become so; but a temporary release is obtained from the pressure of the encroaching horn, and a degree of elasticity, which is natural to the part, is once more communicated to the foot. And if the shoe is now applied, and adroitly fitted and nailed, a great relief will be experienced, and abundant applause may attend it.

It is, however, only a temporary resource, and will in its consequences, with most feet at least, be ultimately ruinous; for it is obvious that this proceeding does not at all extend to the cause of the evil, without which no permanent advantage can be expected: the horn robbed of its harder, exterior coat, and the interior, more succulent one, exposed, quickly dries, and in drying, contracts, and pinches, or compresses the parts beneath, or perhaps cracks, as is too frequently the case, between the hoof and the inflexion; and the frog also, from frequent cutting, dries and diminishes, and at last separates from its connexion with the bar, and wet and dirt being admitted to the quick, it swells and cankers, and is the forerunner of much suffering and mischief, and renders necessary (from the uncertainty and expense of doctoring, at least by those men who have occasioned it) the wretched policy we have stated of "*working them up.*" The frog also flayed to the quick, a frush is generated by the weakness of the frog-stay, and the frog being frushed, and next cankered, and unfit for its offices,—the animal, no longer capable of work, even by the severest abuse, is led to the slaughter-house, its doors are closed

upon him, and the pole-axe, by removing the object, is ever ready to cancel all errors.

It should ever be the object of the skilful veterinarian to preserve the main frame of the hoof as entire as possible, as in it consists its strength to resist the mischief of closing; and as the foot cannot, when nailed to the shoe, expand outwardly, it will, the more the interior is weakened, close interiorly, that we cannot too forcibly inculcate the necessity of preserving these parts.

It may however happen, and frequently does, that instead of even a temporary relief, the very reverse is experienced; and he who, by his boasted resources, was expected to mend, only makes bad worse, by not understanding the application of all the measures necessary to make it succeed; or the want of success may proceed from the foot being already in a state that does not admit of further relief by such means: whichever way is pursued, it is usually found that, year by year, the horse is becoming on the whole more a cripple, and the owner, either with or without having had accidents, in order to get rid of the evil, and avoid further inconvenience, is induced to part with him.—But with the horse himself, alas! it is otherwise; his diseases cannot be parted with, and at each remove falling into worse hands, and a more base and distressing service, he is at last prematurely destroyed; and this happens most frequently before his bodily powers, that is, if they have been duly supported, are materially impaired, or ought to be so at least, for it is before the half of the natural period of his life is expended.

And although there are feet, it is true, that can withstand the influence of these measures much better than others, and resist them for a longer time, such as a strong, capacious foot, as we have before stated, with a slow, uniform progress of the contraction, and good management in the rider, may prevent his coming to harm, yet in a general way it is undeniably otherwise, and especially with our finest blood-horses, and best horses for the saddle, where the greatest perfection in the provisions and symmetry of the natural foot is observable.

Neither in such situations hitherto has the experience of the rider, however long, afforded him the smallest clue for solving his difficulties, or enabled him to warn others how they might escape the evils he has had to contend with; and the concluslon of many a traveller's tale, after a most aggravating, and perhaps ruinous conflict with these circumstances, has been—"*that horses are by nature troublesome and uncertain things, and are attended with difficulties that are not to be overcome.*" And it is remarkable also, that in the case of these crippled horses, coachmen, smiths, and jockeys will often assume an air of consequence and an affected knowledge, or rather knowingness, about the nature of these evils, though in reality they never could comprehend them or their causes; and, far from shame, take a merit in the very mischiefs and difficulties they themselves have created, without knowing how, though they often know well enough how to turn them to their advantage by recommending a frequent change.

Some, in order to avoid the evils of tender feet, ride furiously over the ground, believing the danger to be greatest in going slow; and though in one sense this may be true, yet the miserable accidents which at times accrue from this expedient, sufficiently exhibit the imprudence of such a dangerous alternative, that it is not by such measures that these evils are to be conquered.

We now propose to consider the third year's experiment on the foot of the mare, which then appeared as represented in *Plate 9, fig. 4*, and it will be remarked that the foot is somewhat larger than it was in the year preceding; for in the engraving a rigid adherence was observed to the actual state of the casts. The reason of this unexpected difference we shall now explain.—The possessor of the horse had become somewhat alarmed, and though an experienced

horseman, perhaps for the first time, at the effects of the ron, and the change the foot had undergone, which had been fully explained and pointed out to him, and which induced him in consequence to take off the shoes, and turn the mare to grass without them, doubtless to prevent the further progress of the evil, and to remedy the present defect. The effect of this was, that a degree of fulness and plumpness was communicated to the frog and parts about it, which served for a while to interrupt the regular course of the experiment. And we at one time proposed to turn this circumstance to advantage, in recounting here the curious result of our experiments on the restoration, or proposed restoration, of contracted feet, by this measure of removing the shoes, and turning the horse out; but we shall rather prefer to introduce them under a more advanced stage of the contraction, or in a separate account.

As this unexpected interruption to the experiment prevents any direct conclusions from this year's experiment, we shall in this place state to the reader the interesting result of an experiment on a new subject, which is given in *Plate* 10, *fig.* 1 & 2, made purposely to examine and remove one of the hitherto-apprehended causes involved in this contraction of horses' feet, and tending much to obscure and perplex the notions entertained of this matter; for the influence of the stable has been on most occasions, as may be seen by the writings of my predecessors, thrust in to account for this malady, and cast a ten-fold obscurity in the way of the veterinary profession.

A coarse, ordinary, grey mare, five years old, was purchased for this purpose of Mr. Lush, a distiller in Holborn, who informed me he received her in part of rent from a tenant in the country, and that she had never before, or more than once, been shod, which her feet indeed sufficiently evinced; the form of one of her fore feet is seen in *fig.*1, and the amplitude, and almost exuberant strength of the

Plate 10.

Fig 1

Fig 2

Exp.t 2. On the foot of a young grey Mare given 2/3 of its nat.l size — The Fitvarcous or frog-parts have the ascendency in the Structure of this foot, or are disproport.d large & strong. d. The line of Wear b. the Bulge of the outer Quarter. C the Frog. d. its Cleft. e. Horny margin. f. the Bulbs of the frog & foot.

The appearances of the same foot after being Twelvemonths shod. the Mare having been during this time principally kept at Grass. a. The Cleft. considerably diminished. b. the lines remarkably sunk.

F. Sansom Jun.r Sculp.

furcaceous parts is remarkable.* A cast was made from this mare's foot in Plaster of Paris, from which the engraving was made, and which gives an exact expression of its features. After the cast of the foot had been taken, she was shod, and then turned into a grass field near the village of Peckham, that I might observe if this contraction and hardening of the hoof would take place without any influence of the stable; and the result, after near a twelvemonth, was as seen in *fig.* 2, where the cavities in the furch bulbs, from the loss of elastic matter, and the horn sinking in and following it, are not at all exaggerated, as might perhaps, if not particularly stated, be otherwise apprehended: this more than ordinary diminution, and loss of matter in these parts, will be readily accounted for from the very redundant size and fulness of the softer parts in this foot, as we have just stated in our description of *fig.* 1.

By another experiment also, the converse of this, we are led to a similar conclusion.——At the St. Ives autumn fair of 1808, in Huntingdonshire, I purchased a chesnut mare that had been very little shod, (my express object in this journey being to procure one of three or four years old, that had never been shod, but which I found impossible, so early with us are horses usually shod:) this mare came

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* The horse's hoof appears to receive, or to be imprest in its formation with very different characters, as to the relative proportions of the two leading parts in its composition: in some feet the wall and its continuous parts are particularly strong, with a frog not in the same proportion; in others the frog, with its continuous parts, will be found pre-eminently strong and full, assuming as it were a power at the expense of the wall, which is not stout in proportion.—The frog-stay also, we may remark, in some feet appears large and completed at the third, and in others not till the fourth or fifth year.—Again, the upright or mule-footed horse appears to have a distinct, and almost opposite form and qualities to the low and flat foot, communicating such different properties to the foot, as not only to alter very much its appearance, but greatly to interfere with the regular uniformity of the effects of the shoe. The perfection of the foot of the horse, therefore, would appear to consist in a symmetrically-distributed and duly mingled power of each of the above parts.

the nearest to my purpose of any I could find; and I learnt afterwards that she had been vicious in breaking in, and had been turned out to grass for a twelvemonth without shoes, that she might forget her vicious habits, and the ill treatment she had received.

I purchased her, and led her from St. Ives to Huntingdon, to my friend Mr. Baumgartner's, who kindly interested himself in assisting me in obtaining her; and thence to London. By gentle treatment she in time forgot her fears and vicious habits, and I continued to make her the subject of all my experiments on a new mode of shoeing; and during the whole of this time she stood exposed in every respect as horses at livery are to the litter and dung of the stable without shoes; and though so situated, her feet grew both larger and rounder instead of diminishing, as would have been the case had they been confined by the iron. And that I might more accurately ascertain the truth of this, I took occasional casts in plaster of Paris, but have not deemed them of importance sufficient to deserve being engraved for the work.

That the stable is in no way ever inimical to the feet of Horses it is not our intention by any means to assert; but we are only desirous of exhibiting proof, that alone it is not sufficient to induce the contraction that has been apprehended.

It may be urged that feet often contract in the stable, and without shoes: this we readily admit; but its explanation appears to be that a disposition to contraction has been previously brought on by the shoeing, and which afterwards can proceed without the operation or continuance of the original cause.

Having brought greater clearness into our views by the removal of this generally-apprehended source of contraction, we can now, with more unclouded views, return to a consideration of what the original experiment unfolds respecting feet.

Let us now consider the well-marked cast of the year 1808: we have contrived to have that of 1809 and 1810 represented on the same plate—the dotted lines serving to exhibit the otherwise concealed outlines of one side of each of the two last feet.

The area of the foot in its transverse diameter is seen further diminishing, and the condition into which the preceding reduction has brought the foot will occasion lesser degrees of this change to be now more severely felt. The horn is every where in more close embrace to the sides and posterior parts of the foot; and the horny sole thickened, and almost inactive, is creating a resistance to the internal foot also in this direction, and with the general want of elasticity, will occasion the movement of the bones within the hoof, and of the hoof itself, to be diminished and constrained; the vascular organization also, which is uniting and attaching the hoof and bone together, has also become diminished, and their functions impaired, and has thus prepared the way for *Founder*, and other morbid affections of the foot allied to this disease.

In very upright feet, where the inflexions are lofty, the bars, as the mischief advances, approach the frog, and nearly close upon it, and embrace it almost from top to bottom, as may be seen in the foot represented in *Plate 3, fig. 3*, and by their irritation and compression is quickly generated the running frush, and which in such feet is with more difficulty also got rid of.

That the word *Founder** may be clearly understood,—for the term has been strangely misapprehended and misapplied by the college,† and through their teachings vaguely used to signify simple con-

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* As the ship at sea founders, or sinks into the waves, so in this disease does the bone sink down in the hoof: but the term is probably immediately obtained by us from the old French, *morfondre*.

† So little aware was Coleman of what constituted this disorder, that till lately he confounded it with simple contraction, and evidently did not understand the distinction, which can easily be shown by his works, as also by his lectures, manuscript copies of which are scattered about the country.

traction, or any affection which prevented the proper going of the horse,—that, from seeing this abuse, we are the more induced to give a brief description of this very distinct and peculiar disease of the foot, that there may be no longer any misrepresentations or obscurity about it; for, taking advantage of this state of things, they have made their boasts of pretended cases, which, to look the more wonderful, were stated to be of *foundered* feet, though in reality they had only given a state of insensibility to badly-contracted feet by the vile barbarity of cutting out the nerves of the leg.

A description of true Founder. The foot of the horse not unfrequently has its connexion with the hoof, weakened or wholly detached. The coffin bone in this case dislodged, or its adherence impaired, is pressed down by the natural operation of the weight of the body, and sinking till it meets the sole, it there rests, with its front parts bearing on the front parts of the horn of the sole, forcing it downwards, and sometimes outwards, in such a way that this part, from being naturally concave, becomes of a flat or a convex form. The horse is then truly enough said to be *foundered* or *pomme-footed.**

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* From *pomme*, (Fr.) an apple—not *pomet*, *pomed*, or *pumice*, as we often see it written.—One writer has endeavoured to make the "*pumiced foot*," as he calls it, a distinct disorder from founder, but certainly erroneously, since the state of the hoof he so designates and describes is neither more nor less than the foundered foot after a considerable lapse of time, the hoof then assuming that thick appearance. (*See Stereoplea*, *pl.* 1, *fig* .4.

To afford a name, and of a cast somewhat more classical for professional use than the one vulgarly employed, I formerly ventured, in some lectures I gave on these subjects, to arrange the different appearances or modifications of this complaint, and its congeners, under the following heads or divisions :—

Pedicida, or *The Perfect Founder*, where the disease was complete, that is, with a total detachment of the coffin bone, and a perfect subsidence and resting of it upon the horny sole. (*Stereop.*, *pl.* 1. *f.* 1.)

Pedimota, or *Imperfect or Partial Founder*, where there is a disturbed attachment only, attended with certain deformities of the hoof, and a partial sinking of the bone. Sometimes in recent attacks of this affection, *bladders*, *galls*, or

Many appear to be the varieties or gradations of this affection in feet, and the disease may be formed by a gradual chronic process, or suddenly, and at once, as in a few hours.—Cases within our practice have occurred where it has happened after violent exercise, and the body has become considerably heated, that the foot, suddenly chilled by the imprudent application of cold water, has been attacked by a most destructive kind of inflammation in the vascular tissue and apparatus uniting the bone to the hoof; and these parts being surrounded and confined by the solid hoof, through which, as the fluids thrown out could not penetrate, necessarily take a course to the top of the hoof, and with dreadful pain and suffering burst their way out at various parts of the coronet, lacerating and destroying the texture of these parts. Now it is not in these cases the usual process of purulent suppuration; but a red, watery ichor, escapes from the ruptured vessels, and rends the texture of these parts in such a way as to give them very much the appearance of a torn sponge drenched in blood: and with the sole also it sometimes happens, after such sudden chills, that a destructive inflammation follows in these parts, and the vessels rupturing, pour out their lymph or blood between the vascular and horny sole, which, softening the

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or *bullæ*, filled with bloody serum, have burst out upon the coronet, and by which a timely relief has been afforded, that prevented the total disunion and fall of the bone. And these *bullæ*, or bladders, on their subsidence, after a time disfigure the skin and subjacent membranes with adhesions, knots, and warts. The next affection to this in degree I have called the

Pediturba, or *wrinkled Foot*, by which I understand certain febrile actions and affections, that go no further than to disturb the regularity of the growth, and disturb and wrinkle the hoof, but do not constitute a founder. And next, and last, the

Coarctipes, or *compressed Foot*, which is a simple state of condensation of the whole interior of the foot from shoeing, not however implying founder, though with facility leading to it. To this disease, though as yet undescribed in intelligible characters, a very large proportion of the horses may safely assert an indubitable claim.

horn, it is with dreadful suffering presently forced from its place, and descending, is reduced to a convex form ; and if the attack has been vigorous, it may bring the foot into this state in a few hours ; or it may be that a mitigated attack may happen, not dislodging the bone from its place, or forcing the horny sole, but producing various partial derangements of structure in these connecting parts of the hoof only ; and we have seen callous enlargements of the bones and thickenings of the cellular texture, about the coronet and these parts, arise from this cause, and in a less degree from mere long continued fever or heat, &c., induced in the foot, and the *waved,* the *crooked, ribbed, wrinkled, incurvated,* and otherwise deformed hoofs, appear many times to have their origin in affections of this sort. All we wish to observe in respect to the operation of the shoe is, that if it weakens in any manner the attachment of the hoof to the bone, it prepares the way for such disorders as these ; and they will then arise on the application of slighter causes than could produce them in the healthy, sound hoof. Long, dry, hot summers, therefore, will cause horses to founder, or excessive exercise, or violent or protracted labour, and especially ill-fitted shoes and close nailing, we have seen often in England, and oftener in France, the finest blood-horses foundered in a few weeks from this cause.

In these cases of dislodgement of the bone, the Keraphylla, or horn processes, and the Podophylla, or cartilaginous processes more particularly extend, in following the bone, and appear to fill the space that would otherwise be vacant between the hoof and the bone with a singular material, or mass of *corneo-cartilage,* hard and tough, and occupying sometimes an inch, or inch and a half or more in width. The bone becomes rounded by absorption, its sharp edges being removed, finally occupying a round cavity, or nest in the horny sole.

In foundered feet the inflexions, or posteriors of the foot, in the fully-foundered horse, stand wide, by which at a distance the sunken foot may be known, which is caused by the coffin-bone forcing its way backwards and downwards, and stretching these parts by resting for-

cibly against them—such horses generally try to go as much as they can upon the posterior parts of the foot, bringing them first to the ground, by which the bone, resting against soft matter, is relieved from the suffering which the resistance of the more solid anterior parts of the hoof would have occasioned it. For the treatment of this complaint, as being foreign to our present purpose, we shall refer the reader to p. 9 of the *Stereoplea*.

Founder also appears to arise from very long standing in the stable without exercise, with the mal-influence of the iron assisting in the mischief; for where there is exercise, a slight movement in the bones of the hoof will take place in spite of all the restraints of the shoe; but here there is none at all, no sort of elastic action. And the parts inflame, and derangement is the consequence.

There also appears to be another disease which the Americans call founder. A horse in prolonged travelling becomes heated and feverish and uneasy, and if Indian corn or maize, especially if it be new, be given to him, he is seized with a peculiar affection of the bowels, and they say he becomes foundered. Not having ever seen this complaint, I am not assured of its exact nature, and whether the feet are connected with it or not, or only so casually, and if the attack has been very violent when he casts his hoof.

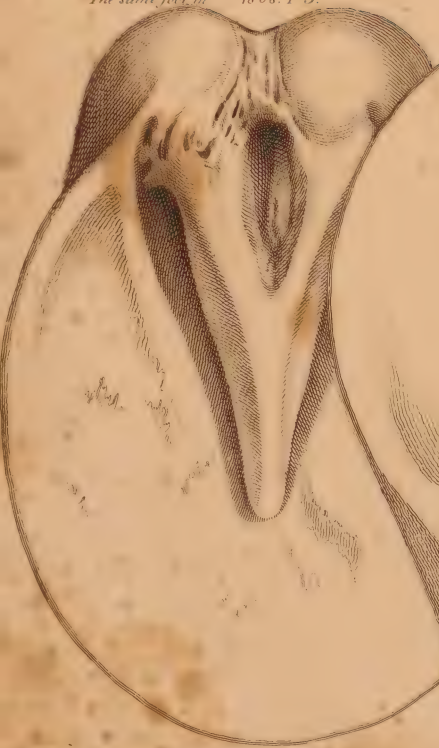
The ancients describe a disease similar to it, which they call *Crithiasis*, from κριθη, *hordeum*, *barley*, and the account of the Greeks agrees very much with the description given by the Americans. We could desire further information on this matter from those who may have favourable opportunities of observing it. It may be mistakenly called founder, without their knowing the proper meaning of that word. Immobility of the limbs, from a load of undigested matter on the stomach, is perhaps what they mean by this term. If so, the diluting or mixing the maize with bran or chaff, and not to give too large a dose at once, we should recommend; or a portion of water along with it, to dilute the heavy gluten of the corn, may prevent it.

All horses which race, especially old ones, must ever be in the greatest danger of founder, being kept all their days in broad iron shoes, and then suddenly, on the day of racing, put into narrow ones, called plate shoes. These kind of shoes are so thin and weak, that they spring to their impression, and being used with all their whole force in the race, the sudden expansion of the foot must inevitably create excessive pain, and tend to dislodge the bone, and finally occasion founder; and hence we see that not only *Eclipse* and *Worthy* were foundered, but a numerous host beside, whose deeds, though great, have not led to their history being recorded, *quòd "vate sacro carent,"*—perhaps some experienced amateur of the turf could afford me the means of abundantly filling up the deficiency. Horses, in the commencement of the preceding complaints, put out and shift their feet as they stand in the stable. Horses also with the shoes kept on too long, and never removed, will acquire this disorder of founder. A contraction also about the mouth of the hoof will give a bulged appearance of its middle parts, an effect we sometimes see; for on differently-formed feet different effects are produced. In some the hoof takes to elongating at the toe, and then they say, very properly, the foot "*runs to toe.*" A natural consequence of the contraction of the sides of the wall will be the protrusion forwards of the toe, lengthening thereby the foot in this direction.

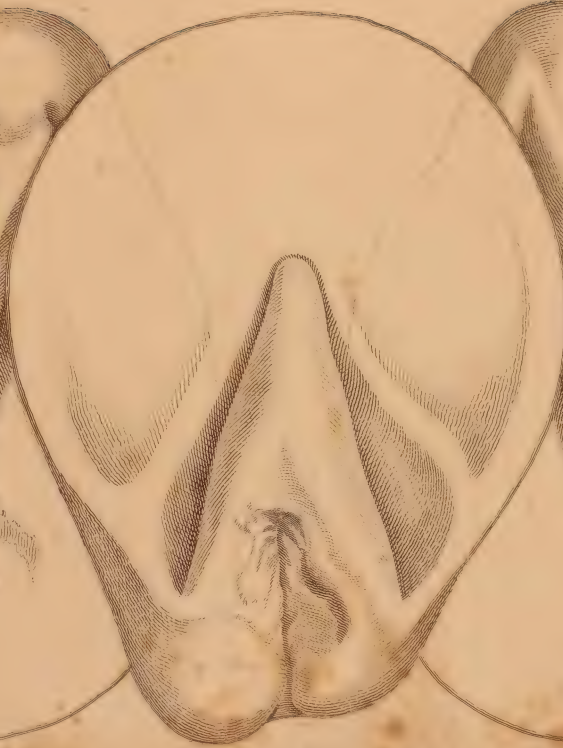
Reverting to the impression, we see, *Pl.* 11, *fig.* 5, the figure of the foot at this period. The frog, or furch, we observe, has become reduced to but little better than the half of its original bulk; being a reverted arch and soft, it has yielded and given way to the impression of the bars without making any great resistance, as they in their turn have given way, with the wall, to the more powerful iron—by absurd cutting of its exterior coat, its figure has become wholly changed from an almost equilateral triangle to a figure not unlike a man's thumb, and its texture, from soft, yielding

Plate II.

The same foot in 1808. F 5.



in 1809. F 6



in 1810 7th cast. F 7.

and elastic, has become perfectly stiff and hard, and, together with the frog-stay, hacked by knives and debilitated, from its weakness, has become exposed to frush, which in the following year will be seen to invade it by a rupture and breaking up of it, which any casual blow is now sufficient for its appearance, but which could not have happened had it been let alone.

It cannot, as the mare is still living, be ascertained in this particular case; but it has been found in several feet that we have examined at about this stage of the contraction, that the cartilages had begun to ossify, and first at their base or insertion into the bone; and it would appear also that this has taken place from the confinement and want of motion in the hoof, which is necessary to maintain the health and tone of these parts. And we have observed also, that in those cases the posterior parts of the cartilages are more affected than the anterior, their motion being of more consequence to them. In cart-horses the ossification of the cartilages through their whole extent is remarkably frequent, naturally; and this occurrence was to us formerly a great difficulty to account for. The above circumstance explains it, and seems to show that the want of freedom in the motion of the hoof, whether impeded by natural causes or artificial, will produce this effect; and the cart-horse's hoof, from being of a much thicker substance, and with less elasticity, consequently is the cause of the generation of these morbid ossifications in them.

And not merely are the cartilages affected, but, what was never known or suspected before, we can clearly show that the very bone is affected, and suffers a diminution, with all the soft parts under the impression of the iron, in a manner that is truly remarkable, losing its beautifully-organized exterior, which becomes obliterated, as may be seen by referring to *Plate* 7, where both states are exposed.

From this collapse or condensation of the hoof, and the morbid actions accompanying it, we get an increased heat of the part, and a more rapid departure of the moisture and perspiration of the hoof,

which again contributes, by the dryness, to create hardness, and to further aggravate the evils that are supervening.

Flat-footed horses appear not so sensibly to feel these effects of the shoe; and in some cases the defects of their nature even appear assisted and relieved by its operation; so these longer sustain its impression, and with less injury than the upright feet. The sole, however, of such feet, from its flatness, is apt to feel the iron, and the pressure of the shoe, by bruising this part, will more frequently give rise to corns in them. The wall is also often ribbed and wrinkled in these feet through weakness, which occasions them sometimes to be called *shelly feet* by the smiths. The furch also is often spreading, and large in such feet naturally, but soon diminishes with the cutting and the iron, and becomes circumscribed by the wall.

The foot now greatly changed, is in a condition for the attack of a variety of disorders; its diminished bulk and increased hardness cannot but be accompanied with pain and its consequences.

We now advert to the 6th cast or impression, made from the same foot of this mare in June, 1809, *Pl.* 11, *fig.* 6. Formerly it was stated that contraction of the foot was not sufficient alone to produce the frush, since we see the most contracted feet free from that disease; yet contraction prepares the way for frush, and afterwards certain casualties are sufficient to excite it. A diminished, hard, and brittle state of the furch, from contraction and thinness in the horn covering it, from its being too closely pared, will render it liable to be broken by collision or impulse against the stones; great heat alone in the feet, proceeding from a feverish state of the body, in consequence of too strong or too much food, and the want of due exercise, or the feverish effects of shoeing, will also induce a frush at this weakened part; or, after the frog-stay has been weakened, exposure

to wet, by occasioning the remaining weakened horn to rot, will induce it. From one of these causes, and we apprehend chiefly the latter, a frush has actually taken place in the mare's foot now under consideration.

The miserable appearance the foot now makes, strongly marks the wasting and impoverishment which a frush, and the loss of the frog-stay, bring upon it:—the meagre sharpness of the heels is very striking, and one side of the frog has suffered considerably more than the other, either by casual encounter with a stone, or from being more cut and denuded by the knife; the inflexion, bent over this side, is encroaching, and nearly surrounds and incloses the wasted base of this smaller side of the frog; and this part would now but ill bear the pressure even of the thumb, much less the weight of the body of the horse in passing over any irregular surface.

The compressed sides of the hoof, and the lengthened appearance of the toe and heels, have now brought the foot to a sort of parabolic figure, from being round and bulging laterally: and the frog, from an elastic, broad, and nearly triangular form, is fast assuming the figure of a man's finger; its centre, wasted by the frush, and its sides collapsed from the pressure of the bars, it is incapable of making any resistance whatever to the encroachments made upon it; so the foot, if now exposed without the shoe, would become as painful, or more so, than if kept in the fixed state to which it is accustomed. This is seen if the shoe be taken off, or lost on the road, and the horse is obliged to travel even a small distance without it, for he then goes lame; and hence the great utility and necessity of the shoe to the foot would be established in the opinion of the public, and would occasion its imperfections to be overlooked: indeed, in this state of the foot, the shoe becomes of the greatest necessity; for, it must be admitted, that the horse cannot now do even tolerably well without it.

If the foot has been previously well formed, or in such way, and

with such properties as it is found with, in the middle order or medium stature of horses, or especially as in the blood horses, it is impossible that inconvenience should not be felt in some way or other in his manner of going, at this degree of the contraction. Some leave the stable tolerably well, and do not at first appear incommoded; but, ere they have travelled far, a want of firmness and proper stepping is almost sure to be perceived by the rider: some, on the contrary, go very crippling and badly at setting off, and mend as they get warm. Their manner of expressing what they suffer will be very various, according to the temper of the animal, the nature of the foot, the more gradual or sudden progress of the contraction, and also the manner in which the shoes actually on the feet are fitted and nailed.

We have not terms to express with any precision the affections, and their gradations, of the modes of going in these different states of the horse's feet; and it is usual to take as little notice of these defects as possible, for very obvious reasons—the fear of lessening in any way the value of the animal, and the dread of being reproached with timidity or want of jockeyship, &c. It is therefore commonly glossed over as of little consequence, or considered a natural sort of defect, and rather to be treated as a subject of jest and ridicule than as an object deserving commiseration: it is usual to consider it as somehow a defect of nature, or that it has some relation or correspondence to the decrepitude of age.

With men employed to drive stage-coaches, these defects are but ill understood, and often made subjects of much humour and merriment, and they continually are inventing pleasant phrases to disguise their being too seriously considered, and remove from public attention the too obvious sufferings of these animals, and prevent what they deem impertinent inquiries respecting them, or any notice or commiseration. The more jocular these phrases are, and the less meaning they convey, the more they are suited to their purpose; for though such men have but blind and obscure views, if any at all, of the

manner in which these imperfections are produced, yet they cannot but perceive them, and there is a pride in not admitting their existence. Thus if any inquiry be made, we are told the horse is "*only a little groggy,*" insinuating thereby that he is tipsy, or goes as a man does that has taken too much liquor, though it is but too obvious that the poor animal could have borrowed his grog only from the glowing countenance of his ruddy friend on the coach-box. At other times, if one presume to inquire respecting it, we learn that "*he is chest-foundered:*"—how this part can ever founder remains to be disclosed: but it is a notorious fact, that the pains of the feet of many horses will occasion a strong retraction of the chest, and hollowness of the skin and muscles at the front of the breast, from its operating probably as a man with a belly-ache holds in his stomach, till the parts habitually take this form, or the effort or exertion of always standing or going on the toes may assist in causing this restriction. "*A stitch let down,*" or "*a screw loose,*" are other rather figurative modes of describing this condition; "*as lame as a tree*" is also a favourite expression, not confined to jockeys, and trees that never move are brought in to illustrate the subject of the going of horses. "*Queer understandings,*" "*shook in the shoulders,*" "*a cat on hot irons,*" "*a nodding cove,*" or "*a hop merchant,*" are choice and lucid terms, ever ready for the satisfaction of impertinent inquirers into the affairs of horses, and serve to guard this mysterious department of knowledge from the danger of exposure. And such answers are but too often received as proofs of deep skill in horse-flesh; for as they convey nothing that any one can comprehend, so they serve to throw an impenetrable veil over these defects, and excite a dread of interference with the intricate affairs of horses.

We have already stated, that phrases are wanting to represent the various exhibitions of suffering; but we may observe as to the fact, that the first effects of tenderness or of pain in the feet that is not very acute, will be, that the animal will not permit the limb to take

the full extent of its motion, and, restraining the action of the shoulder, will occasion a contracted step. This being the first external indication of the pain, it is often, by superficial observers, referred to the shoulder itself. The foot in general, for the same reason, will not be raised so high above the ground, in order that the impulse on its descent may be less, thus inducing tripping. And the going on the toe, as it is the most fixed part of the hoof, and is left unrestrained by the nails, so it remains the soundest, and the least injured by the operation of the shoe; the horse accordingly, when travelling, endeavours to make it serve all the purposes of the foot; and hence the digging, hobbling, and often blundering manner of going. There is frequently also, in the more early stages of the mischief, as at about five or six years old, a degree of faintness, and most distressing sense to the rider of a sinking under the weight, and hardly endeavouring to uphold himself: this is the dangerous period where no art of the rider can scarcely keep him from falling, and is distressing almost beyond endurance. This is the moment of conflict between nature and the iron, which, after a time, differing according to circumstances, terminates in the recedence of all the parts of the foot before its iron protector. In travelling we have often witnessed this feeling, and knowing its source, with an indescribable anguish, without daring to do the willing animal the injustice of punishing it as an offence of his own. Such appear to be the affections and their causes, and by considering them, we hope that in time a more just view of them will lead to a mitigation of their multiform and most cruel wrongs and sufferings.

Our roads every where exhibit what may be naturally looked for as the consequences of these imperfections in the mode of going of our horses. People on horseback are seen quarrelling with their horses, and violently abusing them for their negligence and want of care, as they apprehend it to be, in their going, jagging their mouths with the bits, or using the whip or the spur, "*to keep them alive,*" and prevent their falling; sometimes cutting them on one shoulder,

and sometimes on the other,—for it is a matter that has not yet been decided, whether in these cases it is better to punish the offending limb, or that which is opposite. The nodding of horses, alluded to in one of the above phrases, is a habit frequently seen, and, we have thought, more especially with the hackney-coach horses; it perhaps affords a momentary relief to the fore feet, from partially taking off the weight of the head at the time of making this movement.

And as horses, when brought into this crippled condition, are no longer of much value, so they usually fall soon after into the hands of unprincipled men, who make them serviceable by severity of treatment, with harness more particularly, and the use of the bearing rein, inflicted in a shameful manner; and with such insolence are their measures carried on, that reasonable men scarcely dare to interfere, as the laws do not protect them;* and being cheap, there is no

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* Lord Erskine has, however, greatly to his own, and the honour of his profession, (for one should have expected it more reasonably from either of the other learned professions,) stepped forward in their behalf, and endeavoured to obtain for them the protection of the law. We hope his generous intrepidity, and hatred of oppression of every kind, will not let him desist from renewing the attempt; though we could wish a more generally diffused information, inducing a spirit of humanity towards them, should rather take place to effect their relief, than the terrors of offending against the law. Claims so natural and strong for protection surely cannot long be resisted. Heathen Rome had more humanity; for in the early periods of the Commonwealth, it was death to any one maliciously to ill-treat the oxen, so meritorious were they deemed, and deserving kind treatment for their services and uses, and as having the particular protection of the gods. The horses of their public games which acquitted themselves well, were kept at the public expense till they died of old age.

The sacred writings were not meant to convey a code of laws respecting the usage of animals; but from a single precept we may judge of what complexion it would have been if made, when it is said, "Thou shalt not muzzle the ox that treadeth out the corn," intimating figuratively, that not only they should not receive abuse and cruelty, but that the most liberal and generous treatment should be extended to them.

Richard Martin, Esq., Member for Galway, has, since my writing the above in the former edition, perhaps encouraged by the then ministry, brought in, and carried this bill through the house, and very meritoriously enforced it afterwards in Smithfield and

restraint to cruelty on account of their loss, that they are made to endure the most intolerable hardships and abuse, as though their inability were of their own making, and they merited to be ill-treated for it; excess of labour and suffering soon renders them totally useless, even for this service, and they are then obliged to be slaughtered; for, continual severe pain, which in various ways is their portion, will, as in all other animals, wear out and exhaust the bodily powers, and prematurely bring on disease, and the necessity of their being destroyed; and in this wretched state, often are they seen severely punished and abused, for errors they cannot help, and "when they have done their utmost exertion, because they cannot do more;" and the laws which maintain the most trifling rights of men, in respect to personal safety, had no protection till lately to these innocent and often beneficial slaves from ill usage, however gross and unmerited. Indeed, the shoeing, as it is called, does in fact create a necessity for cruel measures, as it goes on, to keep pace with, and oppose its effects. And much of their ill usage also comes from the ill temper and savage disposition of the half-drunken people usually employed about them, who have little patience with them, and the failings their miserable condition brings upon them. It seems, indeed, a monstrosity of injustice, that after the use of his feet has been taken from him, he should be abused and chastised because he can't go; and especially when we recollect his willingness on all occasions to exert his strength and powers for us, by the slightest intimation of our wishes, even to the extinction of life itself; and contributing, as he most willingly does, to the benefits of every class of society,—the pomp of the great, the pleasures and interests of the middle ranks, and the wants of the poor,—and assuredly not deserving such a return.

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about town, setting an example that has been followed with the most beneficial effects in other parts of the kingdom: we hope the example will also soon be extended to other nations.

Horses by thousands are annually thus destroyed with circumstances of shameful barbarity, by errors induced upon error, and which custom has rendered but too familiar for us to see in its true enormity; and whole centuries* have blindly passed away, in which these errors have not been perceived, in an ignorant and thoughtless acquiescence with them; and formerly with more effrontery and harsh proceeding in those inflicting them than at present. From these causes horses are made scarcer and dearer consequently than they otherwise would be; and a greater number are obliged to be raised for the public supply, and tracts of land must be kept untilled for their support. Men scarcely begin to get used to their horses often, and their horses to them, than they are obliged to abandon them. Post-masters and jobbers of horses are struck with astonishment at their prodigious and unaccountable losses, which can, for a great part, be traced to these causes. It is often the case, however, that from a timid or avaricious spirit, inn-keepers and stage-masters are under-horsed, or without a sufficient number for their work, in order to save the expenses of purchase and of keep, which brings on those they have more labour than is consistent with health: pains of the feet, gross offences to the mouth, unwarrantable and distressing loads, harass and exhaust their natural powers, and farcy supervenes, and is with difficulty again removed. They suffer losses in consequence, which further intimidates them; and they progressively get into worse disorder, and sink at last into the most destructive violence and abuse of them; and then we hear complaints made of great losses, ill luck, &c. I may be wrong in venturing such opinion; yet I cannot but consider that every animal has his natural rights, and that if we avail ourselves of his faculties, we have no right to abuse and maltreat him

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* How much later than the fourth century we know not; but we shall presently exhibit undeniable proof that it was not till after this æra that shoeing with nails was had recourse to, although it is generally imagined by the public that shoeing, and the use of the horse, were necessarily nearly or quite coeval.

in return. Loads ought by law to have some restraint, or we may still with impunity see inflicted more severe sufferings than by the whip; and the cruel and unmerciful is often most ignorant also of his own best interests in this respect. Both this and the bearing rein, by its intolerant application and abuse, may become a more severe scourge and persecution than the lash; mechanical powers, and levers of great length, instead of bits to guide, are now become the rage, and a most shameful annoyance of these poor sufferers.

The implements of the forge, as the hammers and the rasps, are often severely used upon them, and even injuriously, because, forsooth, they will not stand quite still to have inflicted on them what they cannot but perceive does them so much injury.—And I have thought also that in the colder climates, as in England, the temper of the horse is more mild and gentle, and he bears it better than in warmer regions; for even in Paris, which is much warmer, their manners are sensibly changed, and more violence in shoeing them is used by the smiths; and in India, I am informed, the difference of their manners, and their increased fieryness of temper, is very marked and striking.

The enlightened veterinarian should ever as his right, undertake, from his superior acquaintance with the physical properties of the animal, to be his friend and protector from merciless usage; and though it will hardly be allowed in the present day, at some future period, not very distant, this kindly office will readily devolve upon him by general consent.

We are now about to consider the last cast of this foot, that we shall find it necessary to notice *Pl.* 11, *fig.* 7, since the effects and causes have been pretty fully traced, and here we may discover a further derangement and deterioration of nature's fair form, by this pinioning of the hoof, a further elongation of the foot, and running

to toe, and compression of the sides, which must necessarily be attended with correspondent changes in the bone and interiors of the foot. The furch is narrower than it has been at all, and its base, though screwed in and narrower, appears to be less diseased, at least both its sides are become alike, and equally deficient; the frog-stay is only noticeable by its cleft, or rather fissure of the frush, which is become dry, and in a better state than in the year preceding, though the foot be more contracted, disproving the idea of contracted heels being the genuine cause of frush as had been supposed. This diminution and sinking in of these parts must have been preceded by a reduction of the cartilaginous inflexures we have formerly described, and of the elastic resilient globes, or internal bulbs; and nothing now is scarcely left to these parts but horn and bone, the sharp angles of the inflexural columns being covered with a meagre covering of furcaceous horn. And the real width of these parts is now not more than two inches and a half, or hardly so much. How incompetent therefore for its offices is it become, and that he should trip, or blunder, or stumble, can it be any matter of surprise, but is it not rather to be wondered at that he can go at all after this devastation. And what must be the chagrin and astonishment of the animal himself to find that as his feet get worse, his jaws and his sides also become more painfully afflicted in the same degree. For certainly, if we debilitate or destroy the basis of the edifice, the edifice itself becomes afterwards of but little value.

And here we may introduce a further additional circumstance which takes place in some feet, and which we were not fully aware of when we published our first edition, which is, that the Shuttle bone is sometimes fixed by this general contraction of parts, and is found adhering to the flexor tendon, and at other times, (either with or without adherence,) it appears to be affected with points of ulceration of its surface. No case of this sort had occurred to me when I described formerly the effects of contraction, and I have since ascertained, that though such exist, they are comparatively cases of great

rarity. Moorcroft had, however, seen instances of it, and has well described it, and a veterinary practitioner has been very elaborate in his account of it, giving it a frequency that does not accord with facts, and disengenuously it would appear to diminish the notice of the general contraction. Nothing certainly is more easy than to predicate a disease that only the death of the animal, and subsequent dissection could verify the existence of, taking advantage of this, he makes as much or more of it, than the old farriers did in refering all lamenesses to the coffin joint, which puts all denial or dispute out of the question, as nothing could be proved, and therefore men acquiesced, and often gave them credit for a discrimination and skill that did not exist. I have examined no inconsiderable number of contracted feet, without finding a single case of it, and so have others desired by me, that I am convinced it is a truly rare disorder. If the reader wishes to see the discussions upon it both *pro* and *con*, he may find them in the *Lancet* for 1829, and in the *Farrier and Naturalist* for the same year, and in the *Edinburgh Agricultural Journal* for 1830, where nearly all is said that can be said upon it.

To us it would appear that this rare affection has place when the shoeing has been so executed, as to drive the compressed horny sole upwards against the tendon and shuttle bone, forcing its interior edges or the margins of its cleft against these parts,—perhaps in addition to this forcible operation of the shoe, another condition may also be necessary for its complete production, that is, a long retention without exercise in the stable, since at any time the smallest motion of the tendon upon the surface of the bone must prevent it. We hope for the future that the cruelties exercised by interested persons under this pretence will not be submitted to by the public. For it is certain the ignorant and interested are ever at work to find out some pretext for operating in one way or other upon these patient creatures.

And any one would be astonished, who is unused to horses, to observe the patience of the animal under many of his sufferings, and

how little he is disposed to exhibit any appearance of pain. Nails from shoeing we have several times seen taken out of their feet, where they had been driven into, or so near the quick, that they had caused suppuration, and matter and blood has followed their extraction without his driver having at all discovered, by any external indication, that anything was the matter; so that it is clear they do not flinch at a little,—and indeed what avails him to express a suffering, as it only gets him a severer application of the wrenching iron to his jaws, or of the spur or the whip to his sides, that he soon learns to know that endurance is the lesser evil,—their patience is indeed beyond all praise; and I may safely defy any pen, however able, to paint the ungrateful amount of their wrongs and their sufferings: a share of which may now, however, be guessed at. Their strength, supposing them whole and unmutilated, is still tried often with loads that would make one shudder, and much more suited to the force of the elephant than of the horse: if they do it a few times, and are not visibly hurt by it, they then think they may do it always; but not so—the effects are at last seen, and one horse doing it for years, on account of extraordinary strength, the rest *ought*, say they, also to do it—a common and fallacious reasoning. And my only wish, in thus stating these things, is to call up more able advocates to his cause.

In the present state or degree of collapse of the foot, as given at *fig.* 7, the horse becomes but ill suited for the purposes of the saddle, and her owner had sometime ere this put her in harness, and at length made a brood mare of her, and turned her out without shoes. I saw her some eight or ten years ago, and examined her feet, which had a little plumped up from being without shoes; but this does but little for them, since the growth of parts that have been once absorbed is but a miserable representation of the original material and organization, and will bear comparison with the scar to the natural skin, a mere puffy substitute.

Such are the effects of the shoeing when moderate measures are pursued; but I am confidently of opinion, that I have seen this iron

fetter applied by the smiths in such a way, and it has induced such pain and misery, that the animal has never after recovered from its effects, or had the perfect use of the foot afterwards, and one shoeing has rendered him a cripple for life, and others have, after a time, foundered from the effects of the violence so committed.

It has also appeared to me, that the operation of the effects of the iron is not lateral only, but that the sole also is affected by it, from the clenching of the nails, and their being so forcibly driven; and that this long-continued pressure upwards occasions numbness, and sometimes lameness, and is one of the principal causes of cutting where motion is denied to the shoe itself. It must also be evident, that the rapidity of the deterioration of the foot will much depend on the more or less cutting and denudation it suffers by the smith, as well as the more confined or more liberal manner of fitting out the shoes, for which there can no rule be laid down, but which must ever be left to the simple apprehension of the workman.

Another use may be also made of this experiment and of these figures, where we are desirous of describing cases of contracted feet; the degree of it may be pointed out by a reference to them, whereas before, contraction was contraction, and much or little was all we could express of it.

Now in this stage of the condensation, as seen at *fig.* 7, the animal, in spite of all his gayety and courage, must begin to make some external indication of suffering; and whether in this case it happened or not, I know not; but in similar feet I have observed, in some horses, perhaps, where they were more sensitive, and could not bear the pain so well, they would exhibit it by a bowing of the knees and legs; and this is done obviously to avoid a too direct pressure upon the suffering parts, as a more perpendicular direction of the column would obviously occasion: this is often asserted to be natural, and to some horses I do not deny that it may be so; but I can say, that in several instances considered as such, I have known the expansion shoe in a very few weeks bring their legs straight enough: very high

heeled horses, or with high inflexions of the hoof, I have thought were more subject to this affection.

There is no telling the extreme point to which contraction can go; but I once recorded, about fifteen years ago, the appearances of two fore feet that fell in my way, where the extremest contraction existed that I had ever seen; and this was a blood-mare, I believe, somewhere about twenty years old: the following is a copy of the memorandum made of it at the time. "The frog was reduced to the size of the little finger; the cartilages were both, at their posterior portion, thickly ossified: this bony deposit extending inwards, had reached the shuttle bone, *(os transversum)* surrounding its extremities, which were impressed and locked in it. The ligamentary stuffing of the heels, or, to use a more intelligible phraseology, the convoluted, or rather convolved internal globes, were also ossified in their cartilaginous parts, with rough points, and variously perforated. The posterior edge of the middle part of the shuttle bone was eroded; and of the other foot, the front elevation of the coffin bone was enlarged and grown higher by three quarters of an inch, from ossific cauliflower deposit, which appeared to be the effect of a perfectly fixed state of nearly all things. This, perhaps, is only witnessed in extreme cases. But what is singular amidst all this ossification, the anterior portion of the fossa of the coffin bone, in which the cartilage is lodged, was in its natural state, and clear of bony deposit. This, I was led to apprehend, was occasioned by its being connected, half of it with a ligament which rarely ossifies, and which supplied it possibly with a slight degree of motion. The extremities of the coffin bone in both these feet appeared to be full of large cavities, and much absorbed; but whether longer than natural, there was no means of ascertaining. The Keraphylla were, for the most part, removed, and a sort of smooth horn cartilagefo und where they were attached, and so were the Keraphylla of the inflexions in the parts opposite to the coffin bone."

The ultimate effects of the iron on the feet, especially such as the shoes are particularly inimical to, are never seen, since they are no sooner, from loss of parts or disfiguration, rendered unserviceable, than they are slaughtered, that we know not to what condition the foot would at last be reduced.

That I might notice in a more particular manner the first visible effects of the shoe on the foot, I this year, 1811, ordered my own bay mare to be shod with common shoes; she was nearly five years old, and never had had a shoe on. In this experiment I was surprised to find that the upper parts of the hoof first felt its effects; the upper part of the hoof and coronet became heated by it after about three weeks application, and the coronary frog-band became more dry and brittle, cracking away, and leaving the hoof sooner than formerly, and seemed to embrace and bind the hoof more strictly. After the removal of the shoe, which was kept on about five weeks, as the horn grew down, the traces of its effect could be discerned in a depressed ring, which grew down as the hoof grew, and was visibly different to the horn preceding and following it.

Another effect, I believe unperceived of the shoe, is, to reduce and diminish the Keraphylla, and to redden them. An opportunity was afforded me of ascertaining this curious fact in a valuable horse, which belonged to my late valued friend, James Kidd, of Brentford. He was five years old at the time of his death, and had been hardly ever shod. His feet being brought to me for examination, the Keraphylla were found much thicker in substance, and in a remarkable degree broader, even to nearly double the width of many I had seen in feet that had been long shod; and what was singular, and contrary to what we had before apprehended, were not of a red or pink color, but a clear white. The action of this mare, by those who broke her in, and by others who rode her, was particularly noticed as being free, extensive, and firm, to an extraordinary degree, beyond any horse they had ever recollected to have rode before; and their expe-

rience in this way was not inconsiderable; which must have been greatly contributed to, if not chiefly occasioned, by the full unfolding and perfect developement of the organization of the foot.

In 1819, I examined with close attention the Keraphylla of the hoof of a horse that was eight years old, and that had never been shod, or with any other than the jointed shoes, and not much with these. And these parts were found broader than in the shod foot, being a full eighth of an inch wide, and when washed were perfectly white; they appeared also thicker in substance, and their loose edges more smooth, and not so torn or ragged as these are generally seen. And a remarkable difference presented in these feet in the depth of the inner heel, or column of inflection, being very considerably deeper, and the sole also lower down the inflection than in the outer side, to a degree I never witnessed in feet that had been sometime used to be shod.

Having now exhibited the inimitable beauty and simplicity of design in the structure of the foot of the horse, and its provisions for destroying a too sudden resistance to the weight of the animal on meeting the ground, and disclosed by actual experiment, proofs of the injurious nature of the shoe in respect to this property; and though much labour and care have attended these elucidations, yet we apprehend our readers will expect from us the consideration of further topics relating to these matters, and about which they may be even more solicitous than about the above illustrations, which were, however, previously necessary properly to understand the nature of these evils. The reader would perhaps be desirous of asking, What can be done with feet, already injured, as to their restoration? and whether we must be obliged to go on with these errors from the impossibility of removing them? or whether we may partially remove them with those horses whose very utmost work is not required?—for it will be readily admitted by us, that to obtain the full measure of work which the horse is capable of giving on the

road, some artificial defence is necessary; or whether, by refraining from early shoeing, except with tips, the mischief may be greatly palliated, and we must rest content with that? or if we may look for a total removal of the evil in all cases by shoes on a principle widely different? Time has hardly been sufficient for us to consider and answer all these inquiries; nor do we consider ourselves pledged, in consequence of these discoveries of the defects of the present system, to find a remedy; since it has been much to point out a gross evil, that was scarcely before suspected, and certainly not seen in its true light. We believe, however, that preventative measures may be resorted to, to a great extent, and remove a considerable share of the evil, without much inconvenience and loss of labour; and of the remedial means in part, or perhaps wholly, we can, after much reflection, hold forth promising expectations, and which we believe will not be disappointed.

The above extracts, taken from my former edition, serve to exhibit the state of things at the time of concluding that work, about the year 1812. At that period, my views and attempts were considered as quite visionary, and I often experienced the reproach of having discovered an evil for which there was no remedy. But what is still more singular, nine years elapsed, with all the above facts before the public, without the least proposition from any one for the removal of the mischief, as though the case was indeed hopeless. Having, years before the commencement of publishing that work, seen how advantageous would be the disuse of nails, and conceiving that shoes might be attached without them, and be made removeable at pleasure, I had been long occupied with this object; and afterwards, from beginning to see the full effect of the nails, I redoubled my efforts, and, sanguine in the success of it, secured my rights for a shoe of this kind by a patent; but after a long and tedious trial, abandoned it, as being too troublesome for general use, though great advantages had been fully proved by their use on several occasions. I then, fatigued and injured in my health, quitted these shoes, and resolved upon

pursuing the other principle,—for there are but two, that is, to use nails, but to give a motion to the shoe itself. And after trying this for some time, and finding that the purpose was answered, in saving the foot from contraction, and extending the step of the horse, I proceeded to publish, in 1817, the *Stereoplea*, giving an account, and recommending the lap joint shoe, and also giving some account of the former removeable shoes, using a steel-headed rivet for the lap shoe, otherwise it could have been of very little use. I also invented at this time a new kind of shoe or defence, which I called *The Paratrite*, which defended the front of the foot and wearing line only, and was held on by teeth and a helmet in front, to which a strap round the coronet, and buckle was attached: this was easily driven on by means of a hammer, or even a stone, being made of thin steel, and then fastened, became a defence that doubled and trebled the natural powers of the hoof. To pursue, however, historically, or chronologically, the narrative of these proceedings, I may observe, that now the public attention in several instances began to be attracted to it; in this year, my ingenious friend, Benjamin Rotch, Esq., a barrister, seeing the importance of the elastic principle, took out a patent for a new sort of shoe, formed of several pieces, connected together in the form of a horse-shoe by a thick piece of sole leather, rivetting them upon it, and actually sold licenses for using it to some shoeing smiths about town: it, however, though ingenious, proved abortive, as each piece could only receive one, or at most, two nails, which were insufficient, in case one of the pieces should bear the whole weight of the horse, as in the circumstance of his encountering a stone would happen, when the clenches would either give way or break, and then the next piece would also loosen, and thus in succession, the whole would come off; so that it was soon after abandoned.

A little after this period, I found out what appeared to me a much better way of making a joint shoe than the above lap; and that was, by a shoe of two halves united by two rivets, holding a steel piece

between them, imbedded in the pince of the shoe. The trial of this realized every expectation and wish, as being a more durable shoe than any other, and with plenty of motion, which also could be easily limited. I hesitated some time whether to take out a patent for this novelty; but at last determined to give to the horses and the public all the benefit of it, without any clog of this sort, and published an account of it in 1820, and constructed a forge at considerable expense in the Edgeware Road, near Paddington, for the perfecting it, and applying it, calling it *The Steel Tablet Shoe of Expansion.* In the next year, 1821, Colonel Goldfinch took out a patent for a shoe, having no other property than a simple division of the common shoe into two pieces,—of course the two halves, not supporting one another, they would come away, and carry a large mass of the hoof with them,—so that this also was soon after abandoned.*

About this period, whether later or a little earlier I don't exactly know, my worthy friend, Joseph Dockwra, of Kelvedon in Essex,

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* To those who prefer the lap joint, the great evil of it is, the friction of the two surfaces, especially if these are at all extensive, and are rivetted a little stiff. To prevent this, I propose that these surfaces should not be quite flat, but a little matter raised or elevated in the middle, by which the possibility of much friction would be prevented; for the power of the hoof in overcoming lateral resistance is not great, and will be easily obstructed. There is the same difficulty with the tablet shoe, but not in quite so great a degree, and the same measures should be used to avoid it. Both these shoes, made of Lucas's malleable cast iron, are found to wear extremely well, and are formed with the nicest accuracy. In this case, instead of casting the holes, we cast a deep fullering, and perforate them afterwards with the common pritchel with perfect ease. The less these shoes are put in the fire and knocked about the better. We have also thought that, to render these surfaces of the joint less obstructive by their friction, a concentric raised thin circle round the rivetting hole, and another raised line near the external edge, would prevent those surfaces coming in contact, or having any friction. Suet might be lodged also in the vacant depressed space between the two circles, that would facilitate their motion, and prevent rust also, or the anti-attrition compound might be used for this purpose, of suet and black lead.

having purchased and read my work, and disliking the going of his horse, and not being able conveniently to get any expansion shoes, directed his smith, as a resource of necessity, to omit the nails, or leave them out on one side of the shoe, or at least with but a single one near the pince on the opposite side of the foot. This mode of proceeding could not of course but occasion solicitude for the safety of the shoes as to their coming off: finding, however, on trial that the horse went better, and that they did not seem so dangerous as he expected, he persisted in using them, and recommended this mode to his friends at Coggeshall in particular, and it became with many of them a great favourite, and afterwards extended into all the surrounding parts of Essex.

Visiting France in the year 1828, and not being able to obtain a regular supply of the expansion shoes from England for my own grey mare, which was purchased of the Duke D'Escars, who himself took a warm interest in these discoveries, I resorted to these shoes; and from a state of the most miserable decrepitude from contraction, brought her round to go in the most beautiful style by their use. She was vicious in the highest degree in letting the grooms or smiths handle her feet; but after some time would allow me to do any thing with them I wished, without the least resistance, no doubt from experiencing the great relief which they afforded her. At this period I first added two broadish front clips to this shoe, embracing the two sides of the front of the hoof, about three inches asunder, having previously, two years before, done the same with great advantages to the expansion shoe. These additions prevented the shoe from being forced backwards on the pince striking the ground, which is the way shoes most often are forced from their place and become loose, and so applied, they proved of essential benefit, rendering the few nails employed quite equal to the task of holding on the shoe; and in every kind of shoeing they may be resorted to, to render nails less necessary, especially those in the back

parts of the inside quarter, the main point of offence, and which may in a general way be omitted when these clips are employed.

They also act beneficially in steadying the shoe, and, in another respect, that they prevent the front nails, if we nail round the toe, which we most often do in these sort of shoes, from being driven backwards against the quick, and compressing it. In order to the forming these clips conveniently and easily, I use a tool on purpose, to raise the metal from the surface of the shoe, consisting of a shaft of some length with four sharp corners to it, on one of which I raise the clip. This shaft is inserted for this purpose into the hole of the anvil: (see its figure in the description of the Expansion shoe, *Pl. 5, fig.* 3.) These clips should be made to stand fairly out on the margin of the shoe, in order that little or no horn be removed from the hoof for their insertion, as the loss of this defence must make the pressure more liable to be painfully felt.

In this state it was recommended to the attention of my friend M. Crepin, a celebrated veterinary surgeon in the Rue de Bourgogne, in Paris, who shod his own mare with it, which had lately fallen with him, and found in it a perfect remedy for this defect, and an invaluable means of restoring lame and contracted feet, and that had refused to yield to all other treatment. M. Delaguette, of the king's body guard, a very distinguished veterinarian, also used them with the horses of the officers of his regiment, and with the happiest effects. These gentlemen have both of them since nobly come forward, publicly to attest the result of these experiments, in the *Journal Pratique* of the year 1829; and several very valuable horses in Paris were restored by this means to a state of remarkably-fine action that before were but cripples, and almost useless. And I have understood, that since then it has been taken up with success by other professional gentlemen of that metropolis; and thus was introduced the advantages of expansion shoeing into that country. And we may here observe, that although this mode or plan of shoeing

consists merely in the omission of the nails of the common shoe, yet, carried to the extent to which we here describe it, it may be fairly designated a third principle of shoeing; for we have before stated there are properly but two, viz., a shoe that was moveable in itself, but firmly fixed by the nails, and the other, a shoe entirely without nails, and removeable at pleasure. Here the motion or liberty is obtained in a third way, viz., by a shoe firmly fixed by nails, but omitting nearly the half of them on one side, the foot therefore is left to enjoy almost its natural liberty on the other, and, for distinction, we may call this the *Unilateral Principle.*

My friend, Isaac Brightwen, who shoes extensively in this manner, often bevils the heels of his shoes outwards on their upper surface, which greatly facilitates the expansion of the free quarter, and the horses are found to go remarkably well with it. Caution, we believe, however, should be used with this proceeding, in not making the slope too considerable or sudden, in order that the higher metal should not come in contact with the inflexion or bar, which would inevitably occasion pain and uneasiness, as we have formerly experienced. The inclination outwards should also not be too sudden, as it might force a degree of distention that would become painful; therefore the slightest possible degree of slope is what we should recommend, or an entire flat, if this slope is found oppressive; for it is obvious that a shoe, with the heels inclining inwards in the usual way, would be liable to prevent the expansion altogether, and compress the foot, leading it inwards down the declivity. In this state, we may remark, that this shoe has a distant resemblance to the shoe of old Labroue, two-hundred years ago, but with a much more excellent effect, as his notions about it were confined to the heels only of the foot, and went no farther; and the foot being nailed extensively on both sides in his shoe, but little benefit was derived from the bevilling, and not where it was most wanted, viz., on the sides of the coffin bone. Where the shoe itself opens and moves, no such bevilling is at all necessary, as the hoof and shoe move and open together; but to such a shoe a

bevilling may be given to the underside of the heels, in order to assist in forcing the shoe open on its pressing upon the ground.

The above appear to be nearly all the propositions for shoeing these discoveries have given rise to, that are worth recording; others have indeed been made, but of too futile a description to deserve notice. Two forges now, however, I have the satisfaction of saying, and from the bigotry and senseless prejudice that at present prevails, I am sorry to say, two only, professing to shoe on the principle of Expansion, are found in this great city—one is held by my nephew, Charles Clark, in *Stamford Street, Blackfriars*, whose ingenuity and discussions on these subjects are well known to the public—and the other by my friend, Isaac Brightwen, of *South Place, Moorfields.*

I may here just observe, in terminating my labours, that the business of shoeing the horse, hitherto the most difficult, obscure, and almost incomprehensible department of horse knowledge, may now be fully understood by any one inclined to study it, and can only in future remain obscure to the wilfully blind. Those points or matters which the present treatise cannot with propriety embrace, will be found treated of, and discussed in a new edition, lately published, of a *Description of the New Tablet Shoe of Expansion*, giving all the requisite information upon it, and the reasons of its figure and proportions of its parts, &c., with the best manner of forming it, whether by hand, or of cast metal;—testimonies also accompany it of many who have long been in the habit of using them.—

Other branches of this study, such as rearing the young horse and his hoofs to the most perfect state—the different kinds of hoofs and forms which they assume—on foundered feet and their treatment—the actual manipulations of the Forge, with other miscellaneous matters, not properly admissible in either of the former treatises, will be found in the *Stereoplea*, a new edition of which is in contemplation, it having been nearly ten years out of print. Numerous cuts, beautifully executed, accompany the above works, which are sold by

Underwood, *Fleet St.*, and Limebeer, *Giltspur St., Newgate St.*, the former at 12*s.*, and the latter at 7*s.* 6*d.*, and when combined with this present work, form together, in one thin quarto volume, an entirely new and original system of the foot of the horse, and its defence.

Simplicity and clearness have been the chief aim of the writer in forming this work on a subject naturally deficient of expression, and difficult: if any are offended at the strictures it contains, his only defence will be to remind them that the first edition, which might have been rendered severe, contained none of these, and it was not thought necessary to use reproof till twenty years had passed over, and it was obvious no advances or progress had been made towards the light, or towards those truths they could not overturn, and the establishment had become a real clog and obstruction in the fair way of the profession. Then it was that reproach became necessary, and we could easily show that reproaches more severe might have been used without at all o'erstepping the bounds which truth prescribed. And these relate only to those professors now existing at the head of these establishments, and which, from natural causes, cannot be of long duration, when great changes, and it is to be hoped, beneficial ones, may be expected. It is our earnest wish, as we ardently love the pursuits of this profession, and at great cost have laboured in it to promote its views, to take by the hand, and give assistance to all concerned in it that are simple-hearted and honestly inclined; and on many occasions we have given proofs of our zeal in this respect, though badly affording it, and receiving nothing in return but the satisfaction accruing from the act. Public abuses are not often redressed till they have once, or more than once, gone through the operations of the printer's art, and suffered exposure. I believe the pertinaceous blunders, and mercenary patents of the professor, would have rendered the situation precarious to any less confident character; and had it not been for intrigues in army appointments, his seat would have been still less certain. About twenty regiments in the public service require veterinary surgeons, and the appointment, or confirmation of such appointments, have been very much left to him.

This afforded the opportunity of holding out hopes, delusive for the most part, to many scores of pupils, for the few vacancies that might occur, and those would of course be preferred that were the most supple, or likely to carry on the college system.

Schools are certainly for instruction, and not for intrigues or favoritism for private ends: all should be allowed a fair start that either by industry, talents, or qualifications, are rendered fit for these situations; as well might the masters of Eton or Westminster officer our armies, or appoint our ministers,—all dabblings, therefore, of this sort cannot but have an injurious tendency on the general profession. This prerogative, however, we believe to have been gratuitously assumed by him, for appointments have lately been made without his concurrence.

Some few of his partizans, and not wholly disinterested ones, defeated on the main question at issue of frog-pressure, and other matters, have endeavoured to give to the inquiry a personal turn, the too usual course of these things, and have opened a battery of low personal abuse of a most unfounded description, and in no way connected with the question. This will not induce me to follow them in the same line, and I hope none of my friends will engage in it, although even in this way they might have the advantage.

It has been hard to see, after the painful efforts and exertions that have been bestowed in making these small accessions to our knowledge, the wretched attempts that have been used to stifle and suppress them, to support the interests of one or two individuals who have done truly little for the art. The interests of the general profession are quite otherwise, since success in practice will ever depend on the correctness of their views, and he most serves them who contributes to this.

It is by labour and research that a totally new system for the horse will in time be formed, and which, it is fair to suppose, will relax his fetters, and remove the present shameful treatment of this noble and generous slave.

FINIS.

An Essay *on turning Horses out to Grass, with a view to remedy Contraction of their Feet.*

Some explanation is due to the reader for subjoining this present essay to our work on the foot and shoeing, but which we are almost compelled to do on account of *Plate* 7 in that work, of the two coffin bones, which properly belonged to this essay, and for which it was originally executed. We are also induced to subjoin it to the foregoing work, as its details afford us the important intelligence that the foot, deeply injured by the use of the shoe, is not, as has been naturally supposed, ever to be restored again to its original condition by grass, and the removal of the shoe. And in the making these experiments it was that our eyes first became opened, and which led the way to the important truths contained in the preceding work, and to the practical veterinarian and general horseman these facts are hardly of less moment than those discoveries and details.

The high value of the horse will in general make his loss severely felt, but if he is disabled, so as to be incapable of work for any length of time, it is often attended with more serious inconvenience and detriment than death itself; that one should apprehend any accession of knowledge, however small, respecting him, if it has a tendency to preserve him from being injured, cannot but be well received, and acceptable to the public. For it may now be seen how little these affairs of horses have been really understood, or were likely to be so, by those who were supposed by the public "to know them" best; and how impenetrable a bar to their being fully understood did the obscure affections of the feet present! and what an incitement to ill usage, and cloak and protection these intricacies afforded to the machinations and knavery of the ignorant!

Our practice is very often affording fresh proofs of the extensive injury done to horses from the want of knowledge of the facts we

are about to disclose, which we hope may induce greater caution with people in having recourse to this seemingly-natural and obvious remedy for the evils of contraction.

Hardly any employed in these arts could have failed to observe that very many horses' feet became contracted by shoeing; but as it did not occur to all alike, it made them rather refer the evil to some defect of the feet than as being the effect of the shoe, though it might have been seen that the finest and most perfect models of feet were the greatest sufferers by it. And that when this contraction was very strongly marked, and especially if attended with lameness, the practice was, and continues so to be, to resort to measures for expanding the heels again, believing these parts to be the chief sufferers, and that the pain resided there principally. Cutting the horn of the heels away; turning to grass without shoes; setting them to stand in wet clay, &c., or screwing them open, are the methods usually resorted to for this purpose; and many, after the heels had been thus treated, asserted confidently the great advantages that had followed their labours: and in some instances this might be true, but in a general way, we believe, a more close attention to facts would have led them to think differently: for some are so blinded by preconceived reasoning and notions, that facts and results, if they turn out the very opposite to what they expect, do not in the least appear to open their eyes—for, say they, if horses' feet suffer from contracted heels, and these are opened, *it must be* attended with advantage: the reasoning appears strong; it is, however, as we shall see, delusive in too many cases.*

We cannot convey what we have to remark on this subject in any way more usefully than by a faithful narrative of some of the expe-

* Mr. Moorcroft, in his little treatise, has also noticed the fact: he says, that although these horses, after being blistered on the coronets, and fomented daily, &c., and turned out, come up from grass with their feet considerably expanded, they do not appear thereby to have their lameness removed.

riments we made, and their actual results, as they occurred to us, and which, though they embarrassed us very much at first, ultimately served to open our eyes to the truth; but so strong did the reasons seem for these measures of restoring feet by removing the cause, and giving opportunity of expansion, that it was not till after much research and repeated failure that the reason of the want of success appeared: now it appears only matter of surprise that so obvious a reason for this could have been so long concealed. It serves to show how necessary it is for those who would make new discoveries, to hold their minds open to receive impressions which may not comport with their present reasoning, nor lean too much upon it, as it may close the eyes to very obvious and simple truths; it is from this prejudice of reasoning that discoveries when made are often lost again, because the reasoning on which we repose cannot reconcile them, and they go rejected till more enlightened times and views give them a reception; on the other hand, errors supported by apparently-good reasoning shall be continued to be practised for ages, and their ill consequences be overlooked, though constantly accompanying them, being stifled in the apparent reasons which supported them, till at length more accurate research shall point out their evil tendency, and then will appear also the fallacy of the reasons which upheld them; or, which is more common, that the error arises from too general and sweeping conclusions, drawn from apparently simple grounds or premises; but where some lurking condition that is overlooked is necessary in the account, and is sufficient to falsify all the conclusions and reasonings, however clear and strong they may appear.

It would be perfectly natural and easy to conclude, that when the shoe was removed from the foot of the horse, and his foot was left again in its natural state, that it should recover from the effects of its embrace, as naturally as we at night remove shoes from our feet that have been too tight, and find in it a ready and effectual remedy for our uneasiness: and with horses it would be as confidently imagined, that if their shoes were removed, the same good effects should

as naturally ensue: hence the difficulty of apprehending a different result. And long have these measures been acted upon, led by presumptive opinion, and believing in it though false.

The fallacy of the reasoning is now obvious enough; the horse's foot in nothing resembles the human, and the shoe is a bar of iron that has no similitude to our leather shoes; and the perpetuity of its application has no correspondence to the removal of ours every night. That similarity of names merely has served to beguile our reasoning in this respect: a relation of the experiments themselves, in which we have endeavoured as much as possible to divest ourselves of any bias, will better serve to unfold the real effects than a generalizing narrative of the results.

In the month of April, 1804, a Mr. Mangnall applied to me for assistance respecting his horse, a handsome bay hunting gelding, well bred, and about fifteen hands and a half high. A complaint was made of his being tender on one fore foot, blundering with it frequently, so as to endanger his coming down. There appeared no swelling or external appearance in the limb that would indicate a strain or preternatural heat, or other cause for it, which led me to apprehend that a pinching shoe, or a nail too close, might be the cause of the evil. I ordered the shoes to be removed, the foot pared out, and the nail-holes to be examined, and a new nailing and shoe to be used; the foot to be immersed in cold water, and to be afterwards stopped with emollient stoppings. These were applied for some days, but with little relief; complaint was still made of his manner of going, and an anxious desire expressed of parting with him, to avoid expenses, which perhaps before had been found but too often of little avail. He proposed the purchase of him to me, with all faults; and I purchased him at once for 24*l.* Apprehending, with tolerable confidence, that it had been, or was the effect only of the embrace of the nails of the shoes and of contraction that had caused this defective going, and that by a few weeks turning out to grass he would be restored, and become a valuable horse, I had the shoes

removed, and turned him to grass in a field near Peckham, having first pared the hoof thinner, that it might make the less resistance to the expansion of the heels, as we called it. On having him up from grass, about six weeks after, I could not but be struck with the singular alteration of figure that had taken place with both his fore feet, but more especially the near one, which was the tender one. The toe, to use a phrase of the smiths, had "run out," and appeared longer; the quarters or sides of the foot had become flattened and almost bent inwards; the heels had somewhat opened, and were projected more backwards, or at least appeared so, that his foot had more the appearance of a square than a round; his chest was retracted and hollow,—a frequent but not a constant attendant of pains in the feet; he stepped short and tender, and went near the ground, and on his toes as much as he could; his hoof also appeared bent in in front, or was incurvated about the middle region of its height, and assumed somewhat of a twisted figure.

Having no knowledge or suspicion at this time of the effect of the nails, I was wholly at a loss to account for these appearances: apprehending, however, that, whatever it was, a more complete expansion of the foot would probably remove it, I resolved to send him to grass again, by which I hoped soon to obtain the benefit I apprehended must ensue. After being at grass several weeks longer, I had him brought up again; and, having occasion for his services, determined to use him, and not to apply the shoes, that the expansion, from the exercise and the additional weight of the rider, might be the more effectually accomplished: and this I continued to do for several weeks, using him only at times, as his hoofs would bear it; notwithstanding, he went painfully crippling and tender; and sometimes at grass, and sometimes in use, this I continued in the practice of for several months; for though it was during this period my suspicions began to be awake to the probable influence of the nails, and the former experiment to detect it was made, yet I saw no reason

why feet should not be restored again if the cause were removed. Sometimes he would put forth his feet with considerable boldness, and go tolerably fair; but for the most part his pace was miserably crippling and tender, and saving his feet. This difference I have since believed was the mere effect of the spirits he happened to be in to endure pain, or his insensibility to it, or from the manner he was fed, or the state of the atmosphere: he tripped, however, and hobbled, both with and without shoes, that riding became highly dangerous. Finding these measures not likely to restore him, and that longer perseverance promised no advantage, and tired of the ill success and expenses of the experiment, which had now been continued more than a twelvemonth, I broke him in for harness, and resolved to sell him, but with bad success also for several months more, and at last sent him to Tattersall's, to be sold for whatever he might fetch, which was little more than one half of what I had given for him. I drew no other conclusions from this experiment at the time, than that there must have been some other evil than the contraction of the feet to account for his not being relieved. Still confident in the efficacy of the means, a few months before I sold this horse, I bought another also, a brown hunter, of a Mr. Forster, whose feet were tender before, and from corns, as he had been told; but on examining his feet, and finding there was nothing of the kind, I apprehended contraction was the sole cause here also; and the removal of the shoes, and turning out, would set his feet to rights again. I purchased him for about the same sum, and sent him to the same grass field, to be company for the former. The bars were pared away from the frog; the heels, as we are used to express it, were *well opened*, the quarters rasped thin, the hoof smeared with emollient ungents, &c., that there might be as little resistance as possible to its expansion; and nothing that we could devise, with a prospect of advantage, was omitted. Briefly, he became very nearly in all respects the same as the former; his hoof fell in at the quarters, his chest

became retracted, and his action the same as the former; and I sent them both on the same day to Tattersall's for sale, with a similar result.

The ill success of these experiments made me more cautious, but did not at all open my eyes to the cause of their failure. Hoping still to obtain a valuable and sound horse by expanding their feet, I purchased, late in the autumn of the same year, a favourite brown gelding, suffering evidently from contraction, of a Mr. Soley, an eminent surgeon in London; and resolved to try stronger expedients with him, and to give the utmost opportunity for the desired expansion of the foot.

I was very desirous of restoring him to soundness, on account of his good temper and inestimable qualities. We shall call him *Tippoo*, the name we received with him. He was bred by Mr. Shum, a brewer, and, as I learnt afterwards, had early been shod and brought into use: he was sold for tripping, for he had no vice; and I bought him Oct. 7, 1804. His fore feet were tender, going with short steps, and very much on his toes, which appeared evidently to proceed from the contraction of his feet, (his heels as I then apprehended,) and the following measures were used for restoring him. He was seven years old, consequently had been shod about four years, or four years and a half.

Many expedients occurred to me for forcing the heels open mechanically, as by screws, springs, wedges, and the like, or by the means St. Bel used to propose, by bevilling the heels of the shoe outwardly instead of inwards; yet from what I had seen of the want of success attending such measures, and from considering also that if the heels were forced open, unless there was something within that could support them in that state, it could be of no real or permanent utility, I did not pursue any of them; and from reflecting that living sensitive parts cannot bear much restraint or violent mechanical distension, or endure very sudden alterations of form, unless accompanied by a slow process of growth to maintain them; and if disten-

sion was oppressively made, he should have it in his power to relieve himself, which mechanical violence will not admit of, for alteration may be too rapid to be useful. Rejecting therefore these, I considered the hoof divested of the shoe, and moistened by grass and dews, and with a deep channel cut with a drawing knife longitudinally down the front of the hoof, that there might be the less resistance to the expansion of the sides, as sufficient. Further, however, to assist these measures, the inflexions were thinned, and the horn pared away from the sides of the frog.

Anxious for his restoration, for the reasons I have stated, I determined to spare no pains in the accomplishment of it, and turned him out to grass in the fields near Paddington; and conceiving my former experiments had failed from a want of sufficient expansion only, I determined to carry it in this case as far as possible; and attended him almost every week at grass, and continually kept thin the new growing horn, and smeared his hoofs with a compound of wax, tallow, and tar, in order to keep them supple, and prevent the effects of the wet. The frog frequently exfoliated; and it was in attending him there that the nature of these exfoliations first became known to me, as explained in the former part of this work: this part grew much larger, and the clefts and chops, which had formed from cutting and exposure to the dry air of the stable, became very slowly closed and grown out; also a thrush, in the same manner, became dried up, and ceased to discharge, and was without irritation; but the two surfaces or halves did never perfectly unite, from want of powers in the frog-stay. At Paddington, Peckham, and in various places, he was kept during two whole years, and in the winter at straw-yard at Barnet, &c.; occasionally he was rode and drove without shoes, to observe the progress and effects of the remedy, and that the weight and unequal pressure afforded by the road might further assist: but after all this, though his feet became widened, I could not discover much amendment in his going, but thought him on the whole rather the worse for what had been done. I still, however, hoped the removal

of the cause, and the advantages of it would one day appear, perhaps on its being more perfectly completed, and kept him on several months beyond the period I have stated; but at last grew so tired of the expenses, and ill success that attended it, that I determined on his sale, and it was with some difficulty that I at length sold him. The gentleman who purchased him complaining of his dangerous mode of going, I took him again, and kept him in all full three years; but finding no benefit, and rather than have this worthy creature pass through *the using up service*, I had him destroyed, though for coach work he might have brought me from ten to twelve pounds perhaps. I did not, however, yet see why the foot should not recover on the removal of the cause of the mischief.

Beginning, however, now to apprehend that the want of success was occasioned by the feet being undertaken too late, I next bought a young bay Welsh mare, that was stated to have been shod not more than two or three times; though I was afterwards led to believe from her age, which was three years and a half, and from considering the practices of the country from whence she came, where young horses are made, even at a year old, to do a deal of heavy, improper drudgery in tillage, and in conveying wood, coals, iron, &c., (which often strains and ruins them before they are even brought to market,) that she had been shod nearly or quite two years. I entered, however, with tolerable confidence on the experiment, on account of her age, and hoped to get a sound mare by it. I cut away and thinned out the horn of the inflexions, and rasped the hoofs till the blood almost appeared, pared the sole thin, and turned her to grass at Peckham; indeed, that she might have no risk in travelling, this process was performed in the very field she ran in; and after fairly trying the experiment nine or ten months, I still found the same results as in the former, for she went rather worse than better, though at first advantages appeared to attend these proceedings; and after some time her sole appeared more sunk or prominent before the point of the frog than it ought to be, and the hoof rather incurvated

in front, her step became very contracted and tender; and after nearly two years keeping, exposed to all the measures I could devise for expanding them, I sold her at a considerable loss, more a cripple than I bought her.

These repeated disappointments damped my expectation of success; and the expenses of them were severely felt; for in the removal of the cause, the remedy appeared so natural and certain, that any other than a successful result could hardly be believed: this uniform failure, however, led me more attentively to consider if some other change than mere contraction might not have happened to the foot during this collapse of the hoof, and which reflections finally disclosed the true cause of our want of success. Before, however, we enter on this explanation, we shall briefly relate the result of yet another experiment made about this time, which, as it contains some further remarks and particulars than are contained in the preceding experiments, may not be without its use; for in seeking the truth by experiment, we ought not to disguise any circumstances that occur, however contrary they may appear to our present views or wishes. We were greatly incited to this last trial by the cheap terms on which we were offered the subject of it, a stout chesnut hackney gelding, about six years old, with rather flat feet, which kind, we have before remarked, are not so soon injured by the influence of the iron. He had been from some cause or other so offended by the shoeing smiths, that he would not let one of this fraternity approach him, much less suffer them to touch his legs. When I bought him, he was not recovered from marks of violence, which he had got by being confined in a trevis; and now that mode of confinement was become impracticable, for he would not suffer himself to be blinded, or approached with a twitch, or any of the other measures used in such cases, but would exhibit the most determined resolution to use all the means he possessed of offensive warfare; if a smith entered the stable, for he could smell him at a distance, he gave warning by furiously blowing and snorting. This horse was one day inadvertently led into a

shoeing shed, by one not acquainted with his scruples in this respect, and getting loose, he with heels and teeth soon cleared the premises of every individual, who were happy enough in being able to escape his rage. Being almost useless on this account to his owner, I purchased him for about half his value, and made him the subject of a very troublesome series of experiments on a new means of shoeing; for it was become very obvious that if the expansion of the feet was effected, the application of the original cause would very soon reduce them to the same state again, that some other mode of defence therefore appeared necessary. And I so far ingratiated myself with him as to remove his shoes, though not without great caution, and some threatenings on his part; and he was kept for nearly two whole years in the stable during these trials; and if he was rode out, it was without shoes, or with those I applied without nails. His feet under these circumstances (for no particular measures were employed for their expansion) grew larger in all respects, corroborating the experiment with the Huntingdon chesnut mare already related, showing that the stable is not alone a sufficient cause for contraction; and this horse would go better without shoes than any I had before tried, though somewhat crippling and tender, and subject to heats after exercise in the feet and coronets, and would stand sweating in the shoulders and chest for hours afterwards: the expansion having been more slowly effected than in the foregoing experiments, and without cutting or rasping was, I believe, favourable to him. And in the course of making these experiments, a circumstance occurred that gave me much satisfaction; for I found if the horn of the bars, or inflexures of the hoof, was pared away and cleared from the sides of the frog, it greatly contributed to the pleasantness of his going. We should state also that the heels of this horse at length became tender, and with bruises, or *corns*, as they are called, arising perhaps, in part, from the flatness of his feet, and lowness of those parts naturally, and also from the heels, which by shoeing had become stiff, and had suffered a loss of part of their elastic provisions, were

unfitted for use; for with unshod feet, in the perfectly-natural state, which we since have had several opportunities of trying, these things did not occur: and we should also mention, as a circumstance particularly worth attention, that after some time the frog-stay split in this horse, with a dry cleft; and this at length became a running frush, and discharged a fœtid moisture, a circumstance which the more surprised me, as pressure on this part, according to the generally-prevailing doctrine of the times on this subject, should have rather suppressed than created a frush. The same circumstance also occurred to two other horses I tried that had been shod, and which I am the more induced to state, that others, endeavouring to avoid the evils of shoeing, and who may have recourse to the shod foot, as some within my knowledge have done, may be aware of the difficulties they will be liable to.

As the circumstance is alluded to in a former page of this work, we think it right to make mention of it here, that, whilst employing these removeable shoes, though often indifferently made, by our own hands, this horse never used to cut with them, though they had the appearance of danger in this respect; but on one or two occasions, for longer journeys than usual, he was shod with the ordinary shoes, with nails, with which he uniformly cut himself; and which led me to suspect that numbness from the pressure of the nails was an occasional cause of horses' cutting: for after a considerable time, this horse would permit a man, not dressed as a smith, to fasten on his shoes, if I was present and encouraged him. But some time afterwards becoming tender of the near leg, from an old strain, got probably by being put in the trevis, and from the other circumstances we have mentioned, we were induced to send him also to Tattersall's, where he was sold for about a third of his original cost.

I was now induced to give more attention to the condition of the coffin-bone in those horses that had been shod, though without much expectation of its leading to any thing important, and procured several from the slaughter-house, and macerated them so as to get them

clean from their envelopements; but from these no conclusions could be drawn, having no bone in its natural state to compare them with, and, for aught I knew, the appearance they made might be the natural one. At length, a three-year old natural bone was obtained, which gave me proof of these bones being changed materially in their structure by the operation of the shoe; and some time afterwards, through my worthy friend Mr. Bloxham, veterinary surgeon, of the Royal Guards, I obtained one that was four years old, from a horse that died with his first shoes on. The extraordinary exterior of this bone was delineated most accurately from nature by the pencil (to which I have been before so often indebted) of my much esteemed friend Mr. Sydenham Edwards, and was carefully copied in the engraving by Mr. Sansum. We may see in its surface an organization of extraordinary beauty, perhaps more so than is to be found in the bone of any other animal: see *Pl.* 7, *fig.* 1.

On the same plate is given also the representation of the coffin bone of a horse about eight or nine years old, (see *Pl.* 7. *fig.* 2,) that had been uniformly shod; and the difference of their form and surfaces will sufficiently exhibit the cause of our want of success in restoring feet. For the general figure of the bone is changed, and the beautiful organization of its surface has undergone almost perfect obliteration, that if there be any convenience or use in this remarkable construction, it is now lost.

The sides of this bone, from a wide or enlarged crescent, have now assumed a flat oval figure, and from sloping, have become nearly upright. The *patiloba*, with its exquisite configuration, is entirely lost, and the surface, where it formerly existed, exhibits a collection of ragged cells and cavities with hard sharpened edges, and which surfaces have been usually hitherto given as the natural surfaces of this part of the bone. The physiologist well knows there can be no regeneration or reproduction of a bone so diminished.

On the same plate is also seen, at *fig.* 3, a view of one extremity or *retros* of the coffin bone, having a portion of the cartilage ossified,

and adhering to its upper edge, in the way it is found in many horses after they have been shod a few years, showing the commencement, as well as the direction that these ossifications usually take in their growth, and which at length rising above the hoof to the sight and touch, are then called *ring-bones*, being found in the circle or ring of the coronet.

The general conclusions, which these experiments seem to afford us, are these :—In the two first experiments it was observed that the hoof became incurvate, or bent inwards in front, a circumstance we have since noticed very frequently with horses turned to grass without shoes, and which appears to arise from the coffin bone sinking under the weight, and dragging the hoof after it, and which, we apprehend, is occasioned by the operation of several causes. The general frame of the hoof being now unsustained by the shoe and the nails, and moistened by the dews and the wet ground, is softened, and thinned also by the rasp or the knife, gives way, and opens in all directions ; the inflexions, which had been for a long time closely confined, suddenly open also, and extending, dilate the horny furch, and thus diminishes its power of support to the parts above ; the shoe and nails being away, the sole also will flatten, and its *commissural ridge*, or line of union of the bar, sole, and furch, will sink, and no longer afford support to the parts above, and these will incline, or be drawn downwards ; also the coffin bone itself diminished and absorbed, as we have before explained, will be forced down either alone, or bringing the front of the hoof along with it : in the one case we have a decided founder ; in the other, a *pedimota*, or a flattened, or a protuberating sole, and inflected hoof.

The flattening of the sides of the hoof also, that we have observed frequently to happen if horses are turned to grass, seems to arise either from a partial descent of the coffin bone, or by a rapid absorption of the sides of the bone itself ; for it would appear not improbable, that although the nails, acting by pressure against the sides of the bone, occasion its absorption, yet permit it only to proceed in a

certain ratio, depending on their application; but that after their removal, this disposition to absorption which they communicate to the foot, can perhaps proceed with greater rapidity, that is, if the hoof be rendered flexible enough in this part to fall in and follow it, than when the shoe is on. The *running to toe*, and its enlargement, may also be another cause of these parts diminishing.

In the experiment with the bay mare, the hoof, from being very much thinned, and naturally not very strong, the coffin bone descended so as to bear on the sole, creating a fulness there, and bringing on a species of imperfect founder, that the experiment is not conclusive as to the benefit that might be derived from turning out at this age, though it may serve, however, as a useful warning not to resort to the application of similar measures with such kind of feet.

The experiment with *Tippoo* seems decisively to show that three years of liberty, or nearly so, of the foot, is insufficient to do away the effects of five years of shoeing, with all the assistance that can prudently be given it, that is, if the shoes, as was his fate, have been applied at an early age.

The important conclusion we draw from these experiments and facts, and which we wish to impress forcibly on the reader's attention, is, *that after the foot has been exposed for a certain time to the operation of the iron, it becomes so much changed from its natural state, that it is more adviseable for it to remain in the diminished and fixed condition to which it is reduced, than by any measures, especially severe or coercive ones, to attempt its restoration; as any sudden or violent change appears to disturb the foot and bring on morbid affections, rather than the healthy condition of the part; so that a continuance of it in this state appears the lesser evil, or even an advance of the mischief, if it be a very slow and uniform one, is to be preferred.* Such appears the disclosure and unfolding of this mysterious matter, and which, though it may appear simple when explained, has been a most seductive and perpetual stumbling-block to people both in and out of the profession.

The exposure of the foot for a few days or weeks without shoes at grass, if the foot be strong, with a view merely to cool the foot, or remove any casual compression from a nail, is not intended to be included in the above caution; but from further exposure, detrimental effects may be apprehended. In the course of our professional labours, we have often been called to feet lamed and disfigured by turning out, and have recommended, as speedily as possible, the re-application of the shoe, as the best resource, in order to bring back the fixed state of the foot; but for a long period after, we have seen them to go very crippling, and that accidents, and the sale of such horses have generally followed.

How long, after the shoe has been in use, we may turn out without it with good effect, remains to be ascertained, as this will depend very much upon the constitution of the foot; for the variations of the hoof are very great, and very different effects will arise upon similarly constituted feet, according to the period of life at which the shoeing commenced, and the manner of its having been conducted. Certain it is, that few think of having recourse to these measures till serious inconvenience be felt; and then it will be found, in a general way, too late to do much good; that such means cannot certainly be resorted to too early.

Those horses which have been shod, and used with expansion shoes, will better bear exposure than the others with common shoes; and with the expansion shoes, if no great allowance of motion is made, (for it can easily be regulated,) the most perfect security from injury may be relied upon, and their feet be usefully relieved.

In terminating this work, we may observe, that the facts and the knowledge contained in the preceding pages are such as Veterinary Colleges were instituted to discover, and to lay before the public for general advantage, as well as for that of the profession; but it appears that the principals, having lost their way among the briars and thorns of false doctrine, have endeavoured to keep real improve-

ments out of sight. Nor is it altogether on my own account that I have so often adverted to their conduct in this respect; but on account of a large body of men, whose interests have suffered by it, and who have been taught erroneously, and conceived prejudices in consequence greatly to their own and my injury.

False theories spread with ease, and are often more fascinating than the real truth, as she generally comes surrounded with her numerous train of circumstances and conditions; she may be said to rise as from a deep and obscure well, gradually and slowly, sifting her dubious way as she advances to the light; when arrived, however, she is a rich reward, verifying every thing she proposes, and becomes to the anxious practitioner a true delight.

Gaulter, Printer, Lovell's Court, Paternoster Row.

TESTIMONIES

COMMUNICATED

BY VARIOUS PERSONS IN FAVOR OF THE EXPANSION SHOE.

LONDON:

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1828.

[*Entered at Stationers' Hall.*]

ADDRESS TO THE PUBLIC.

These Testimonies are brought forward in order to convince the public of the practicability and pre-eminent advantages of the new system of Expansion Shoeing. One would suppose that so obvious an improvement in the shoeing of horses, would have hardly needed any testimony in its support, being so very natural when shown and explained; it has met however such unreasonable resistance from persons interested in suppressing it, and others whose opposition is almost unaccountable, that the Author has thought proper to adopt this course, in order to remove all doubt from the minds of those who are looking on with unprejudiced eyes and wishing to be satisfied of its value and utility.

There is one circumstance to be remarked in making these testimonies public, that we are obliged to give them as we find them, with all the ideas their separate writers entertained; some of which as they certainly militate against the author's own reasonings, he does not consider himself at all answerable for, every individual viewing the subject in a somewhat different light, of course is alone responsible for his own peculiar views. The parties who supplied them are above all suspicion of collusion, men of sense, education, and stability, that would not easily be deceived, and whose suffrages could not be purchased.

The Inventor of the Shoe has no patent rights to serve in pressing it upon the public, or hopes of obtaining any pecuniary benefit, the discovery has only been to him from its commencement a source of heavy expence without profit, but this has never been his object, and in refusing, contrary to the solicitations of his friends to take out a patent, he was actuated solely by a wish that the public and the horses should derive the fullest advantage from so important a discovery. But it has been

the fate of almost every valuable improvement in the useful arts to be for some time neglected, unheeded, and opposed, and the owners of horses have hitherto suffered themselves to be deterred by the opposition of their grooms, the ignorance of blacksmiths, and the various difficulties with which the subject was at first encumbered, from adopting a plan which is calculated to prolong the services of these useful and costly animals to perhaps a double period, and with comfort to themselves. It has unfortunately happened that many persons with full faith in the system, have made trials of the shoe in its imperfect state, and meeting with difficulties have renounced the principle altogether. A persuasion has also gone abroad that the Expansion Shoe is solely intended to *cure* contraction and the evils of the common method, whereas it must be obvious that were it generally adopted, these diseases would never exist, or in other words be *prevented*, and the feet of the horses would be *preserved* in their original state, which next to protection, should be the paramount consideration of a shoe.* But these misapprehensions and the formidable difficulties which have hitherto retarded the adoption of this valuable discovery, are now passing away together, and it is confidently hoped that these testimonies, from men whose veracity and experience no one can reasonably doubt, will have a considerable effect in facilitating so desirable a result.

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* In consequence, the New Shoe has been hitherto chiefly applied to the contracted feet of horses which could no longer go in common shoes, under such circumstances it was unfair to condemn its want of success in every instance, though it will be seen it has afforded opportunities of accomplishing many remarkable cures, and has in a general way succeeded.

TESTIMONIES, &c.

Pangbourn, December 25, 1819.

My Dear Friend,

I have very great pleasure in stating to you the result of my experience of your invaluable Expansion Horse Shoes; my little horse, which is but three years and a half old, has been shod with them ever since I have had him, and before then he was unshod. His feet are in excellent condition, no signs of contraction evident; but on the contrary they continue to expand and grow with the other parts of his body. His style of trotting is remarked by all my neighbours as being admirable, which I attribute entirely to the Expansion Shoes.

I shall at all times feel a pleasure in shewing his feet to any persons you may refer to me, and you are at full liberty to make any use of this that can tend to the establishment of so desirable a mode of shoeing.

I remain,
Very truly, your Friend,
W. H. BAZING.

(My worthy friend W. H. Bazing, continued to use this Horse for four or five years after this, always with expansion shoes, except on one or two occasions where he could not get them. Afterwards having need of a stouter horse he sold him to a Gentleman of his acquaintance, who shod him with common shoes and with one bad measure upon the back of another he did not survive it more than about twelve months.—*Editor.*)

Extract of a Letter from John Hall, Esq.

Pinney House, Devonshire,
January 10, 1820.

My dear Friend,

The horse I shod four years ago with the Jointed Shoe, has been continued in the same method to the present day, and his foot presents a beautiful specimen of the intentions of nature in the construction of the foot of that noble animal. He is in the possession of my friend, Thomas Herne, Esq. of Long Street House, Enford, Wilts; to whom I parted with him, on account of the superior goodness of his feet, and firm method of treading on them. It is proper to remark that

this horse had been shod upwards of eighteen months in the common way, and that contraction had evidently begun. Since I have resided here I have invariably used, and with success, the Jointed Shoe!—one instance is within the reach of your knowledge, my friend;—it is of a young mare I purchased, that had never been shod, and which I broke in myself for my worthy friend Joseph Wassell, No. 9, Pickett Street, Temple Bar, where she may be seen;—she has never been shod in any other method than jointed shoes.

And believe me always, your sincere Friend,
JOHN HALL.

Bristol, December 26, 1819.

My Dear Sir,

Having made a trial of the Expansion Shoe, recommended in your *Stereoplea*, upon a mare that became an early cripple, I shall have much pleasnre in communicating to you the result of its operation, and I believe the best will be to inform you under what circumstances it was applied. The animal was pretty well bred and shod the day on which she completed her fourth year, with the first expansion shoes, and having been shod at the same forge, before the third year of her being in use, she began to go near the ground and tender, so much so, that riding her became unsafe. She was broke into harness, which rendered her rather more useful for a short time, but she soon became lame, and was obliged to be turned out; and in her coming into use again, her paces were crippling and bad. About this time I obtained from you some shoes with the rivet head, and applied them—the effect was instantaneous; instead of walking in a gig down many of our steep hills at the rate of two miles an hour, as she had been accustomed to do, her pace was increased to the rate of five miles, and with the greatest safety, and there is great reason to believe she will be a very useful animal for some years, in consequence of this great discovery.

I am, dear Sir,
Your obliged Friend,
EDWARD SHEPPARD.

No. 19, *Swithin's Lane*,
November 18, 1819.

To Mr. BRACY CLARK.

Dear Sir,

I have used your Joint Shoe upon the fore feet of my last two horses, and am certain they have proved of the greatest service in preventing contraction.

You are at perfect liberty to make use of this communication in any way you think proper.

I remain, Dear Sir,
Respectfully and truly yours,
JOSEPH TRAVERS.

TO MR. CHARLES CLARK, VETERINARY SURGEON.

33, *Montague Square.*

Sir,

I am sorry to have delayed answering your note, having been much engaged in my professional occupations. I am happy, however, in the opportunity of bearing testimony to the advantages of the system of shoeing recommended by Mr. Bracy Clark. In examining the merits of any new system, it is often right to advert to the character of the individual who recommends it, and it is highly satisfactory, in this instance, to know that Mr. Clark possesses deep and most accurate knowledge of his art, both as to the anatomy and physiology of the horse, (more especially as regards the foot of the animal, the anatomy of which he has most happily elucidated); and also that he has an enlarged and cultivated mind, not liable to be swayed by prejudice, or to be blinded by theory. Although the evidence of an obscure individual can be of little weight in a subject of such important and extensive application, yet it may be satisfactory to those who are interested in the improved mode of shoeing, to know the extent of my experience in it.

I have at this moment a horse, which has been shod 7 years with the Expansion Shoe. I was driven to its employment by necessity; I have continued it from the strong conviction of its benefits. It is more than seven years ago that I purchased the horse to which I allude,—he was then four years old, had done no work, and had a colt's foot, as round and in as fine order as ever was seen. The work of the horse of a medical man in the country in good practice, is no trifle, and this animal had his full share of it. The smith I employed was one of those native talents whom we sometimes meet with—a good workman, who can apply a common shoe better than any man I have ever met with. My horse had not been worked more than six months, before he began to stumble and blunder—went tender on his fore feet, and at last was very near falling with me. I was convinced that the defect was not in the animal, but in the shoeing; and I consulted a Veterinary Surgeon, a pupil of the Veterinary College, and of considerable practice in Bristol. He assured me that the cause of the evil was corns; and he stated to me that corns were produced by improper pressure, and contraction of the foot. The treatment recommended was singular. He said that the best plan was to expand the heel, by putting on a bar shoe, which, by taking the bearing of the frog, would thus cause the frog to expand the heel of the foot. It is difficult to imagine how the foot of a horse can, by any possibility, be made to expand by nailing a ring of iron to it,—one would imagine that such treatment was the most certain possible way to prevent such an effect, and that it was most calculated to keep the walls of the hoof in one situation, without any possibility of their expansion,—yet the contrary is the idea which has obtained among the veterinary surgeons of the present day, and they have founded their practice upon it. Thus, Mr. Coleman's patent shoe is intended to take the pressure of the frog, and so to expand the foot, the frog being supposed to act as a wedge. The foundation of bad practice is defective physiology; and this idea of the use of the frog, has led to the worst results.

Although my horse was somewhat relieved, yet I was convinced, on reflection, that this treatment was by no means calculated to effect a radical cure, or to obviate the recurrence of similar evils. It was then that my attention was directed to the Expansion Shoe, recommended

by Mr. Bracy Clark. The smith I employed was induced to take pains with it, and he made a very tolerable set of shoes, and has continued to make them for me ever since, till the last twelvemonths that I have been in London, or its neighbourhood. The advantages of this plan have been the following:—1st. The preventing the evil of corns; 2dly, the horse, although he has been worked night and day for seven years, has a foot as round as a colt, and as expansible at the heel as if a shoe had never been worn; 3dly, instead of being puffy and strained in the joints, he is as clean in the legs as a two year old. There has been no inflammation of the feet, the consequence of contraction, or of inflammation extending up the leg; but he is free from all the evils consequent upon long shoeing in the common way. 4thly, he steps flat and full on the ground, so that the sound of his foot is recognised by persons accustomed to him. 5thly, he does not know how to stumble.

I will conclude with two observations, the result of pretty extensive experience. 1st, That the frog of the horse is not destined to receive *primary* pressure, but only secondary pressure. When the foot expands, the frog comes to the ground; but if it receives the first impulse of the weight of the animal, inflammation and lameness is the consequence. 2dly, I believe corns are constantly produced by pressure on the bars, and that is caused by the shoes not being bevelled off at the heel, which they ought to be to the inside.

It is fair to add, that the mode in which my horse has been shod by your workmen at the forge in Gray's-inn-lane, has been perfectly satisfactory; and excepting once, when the shoe pressed on the bar of the foot, the horse has always gone with perfect ease and comfort.

I am, Sir,

Your obedient Servant,

J. C. COX, *Surgeon, Montague Square.*

Staines, 9th mo. 24th, 1827.

My esteemed Friend,

I fear that I have no sufficient apology to offer for my negligence in not sending some testimonial of my approbation of the Expansion Shoe, but I sent a message some weeks ago by our common friend Charles Trimmer, to say that I had been prevented from fulfilling the expectations that I gave thee, partly by numerous engagements, and partly by a dislike to enter into any controversy; and I feared that I should inevitably fall into the latter, through the warm interest which the *Lancet* takes in your invention, if I sent any account, however small, to the Editor of that very useful, though somewhat acrimonious work, of which I am a constant reader.

I certainly can have no objection to state that I have used the Expansion Shoes uninterruptedly for more than eight years; that I am fully convinced of their utility; that they have been the means of my continuing the use of two horses for several years, whose services would otherwise have been lost; and that I am persuaded, if prejudices could be got rid of, it would be regarded as the greatest improvement in shoeing the horse which has ever been proposed. But there are a few difficulties to surmount before it can be properly appreciated, and as these unfortunately occur, chiefly, on its first adoption, it demands a patient and unprejudiced mind to encounter them.

In the first place it requires considerable skill in the application of the shoe, to fix it firmly on the foot, without nailing it too deeply. If the former is not done the wall or crust will be apt to

split:—if the latter is done the horse will probably be lame from wound or improper pressure on the sensible part of the foot. But a good smith soon acquires the art of doing it properly and effectually, and I have now no more trouble than with common shoes. In the next place, if the rivet or rivets in the front of the shoe are not well made, and of tough iron, they are liable to break; and the shoe becoming loose on one or both sides, may hurt the opposite leg before it is discovered. But this never happens to my horses,* because the smith is aware of it, and takes care to prevent it, which is easily done, and wants nothing but attention. Again, as the front of the shoe, or tablet, is made of good steel, it wears so slowly that the shoes want to be removed, at least once, before they are worn out; and, not attending to this, the foot is apt to grow too long in front; and the sole sometimes becomes too thick, and occasions uneasiness to the horse, before it is thought of. This, however, it is clear that a *little* care will prevent. How it happens, in this enlightened age, that the advantages of the expansion shoe are not understood, or not profited by, has often surprized me. When the structure of the horse's foot is considered,—that it is altogether formed on a principle of elasticity; and that a free play of the parts is essential to preserve it in good health,—that the expanding property of the shoe allows of this play,—and that without this, or some similar contrivance, the foot of a *shod* horse must be immoveably fixed, and all such play prevented; it seems more befitting an age of ignorance than of knowledge to oppose the improvement because it does not emanate from the college. I have no doubt at all of the eventual success of the invention. If the English will not adopt it, foreigners will; and to them, and especially to the Americans, we must look for the unfettered employment of the improvements of others, and a large increase of inventions of their own;—the natural consequences of the emancipation of the mind from the influence of power, and prejudice, and narrow and exclusive interests.

Wishing thee success in thy undertaking to the full extent of thy wishes, I am, with kind regards to thy uncle Bracy Clark,

Thy sincere friend,
W. TOTHILL.

P.S. If this letter, or any part of it, will be of service in forwarding thy views, thou art at liberty to make use of it; only don't draw me into contention, which I detest.

Pangbourne, May 26th, 1822.

My dear Friend,

I was in great hopes I should have had the pleasure of a letter from you when at Birmingham, or on your return: but suppose that constant attention in promoting the advancement of your invaluable system has prevented it. I should have written to you before now if I knew you were at home, but as you said you intended going to France on your return from the country, I was in doubt whether to write or not; but I have now something to communicate that I am sure will give my friend great pleasure, and therefore must immediately set about it; it is this following *triumphant fact!* A gentleman of the name of Jones, who travels for the house of Francis and Child, of Ludgate Hill, was staying a few days at Pangbourne. His mare, *natu-*

* Nor did it ever to my knowledge with any horse whatever, the shoulder preventing it. Editor.

rally a very good one, was very lame from "shoeing upon unnatural principles," and hearing that my little horse was shod in a manner different from the common mode, he obtained an interview with me through his lady, and upon my explaining to him the nature and elastic principle of the hoof, by means of your beautiful model, he was so convinced of the truth of the doctrine, and the advantages of the expansion shoes, that he was anxious to shoe his mare with them; fortunately I had by me the pair of shoes made by you for Shackel's horse, which had not been put on as he had bad corns, and I did not like to risk their credit with him; they exactly fitted the mare, and were applied on Monday the 13th. The next afternoon he took her out in the chaise for the first time, and on his return he came to our house a good deal alarmed, as he said the mare was so lame he had the greatest difficulty in keeping her on her legs, and wished to have the shoes off; but I dissuaded him, and assured him it was merely from the new situation the feet were in, and that they would adapt themselves to the shoes; he requested me to take a ride with him the next day, as he was going to Oxford on his journey,—to which I agreed. We set of about twelve from here, dined at Wallingford, proceeded on to Oxford, baited, went on to Islip, where he did business, then on to Bleckington, where he had business, and then to Woodstock, where we arrived about ten at night, a distance of forty miles, and which the mare performed with apparent ease. I drove her myself the whole way, and although so lame the day before, she hardly even limped or tripped once. Mr. Jones, I need not add, was most agreeably surprized. Next morning I drove to Oxford in less than fifty minutes, and returned by the Dart, Reading and Oxford coach, leaving him to perform his journey in excellent spirits towards London. You may very well imagine I was much delighted at witnessing the improvement in his mare, but that was much increased upon receiving from him, yesterday the following note.

"*Mr. W. H. Bazing.*

"*London, May* 28, 1822.

"RESPECTED SIR,

"You will undoubtedly pardon my freedom in writing for your satisfaction, as well as my own,—through taking your kind as well as friendly advice, which I shall ever feel in gratitude particularly obliged for. The mare being shod by Mr. B. CLARK'S EXPANSION SHOE, improved daily, and felt much less of the lameness, insomuch that I extended my journey further than I intended, and was home in London on Sunday morning last; instead of that I did not anticipate reaching town till Tuesday evening or Wednesday. When I left you at Oxford on Thursday last, we plainly perceived the mare went much better the short time we were together; but that was nothing to compare to what she performed the latter part of the journey, the distance being very far and the heat of weather all against her; but that seemed to make no sort of difference, as she went as light in hand as ever I have known her to do. I am just now going into Kent and Sussex with her, and have no doubt shall bring her home better than when I started, which result I will avail myself the opportunity of letting you know when I return, which will be, if *all's well*, in or about a fortnight's time. Please to accept my sincere thanks of gratitude, which I shall ever consider myself indebted to you for your polite attention towards me.

"I am, Sir, your's most respectfully,

"CALEB JONES."

Now this, my dear friend, is what I consider a triumph indeed; *lameness almost immediately relieved!!* and an *extended* journey performed in less time by two or three days, than the original

journey was set at ! If this will not convince even prejudiced minds, nothing will. I have now to request you to make two pair of shoes for a gentleman of the name of Dell, who lives at Reading, and has got a well-bred mare. From my explanation he is anxious to have her shod with Expansion Shoes, and I think her a fit subject for them, as she is but six years old, and shews no other symptom of pain from fetters, than going very much upon her toes. Pleasé to send the shoes directed to me at the Broad Face, Reading, as soon as you can. I very much wish to see you. Can't you come for a day or two this summer; it will afford us both, I trust, much gratification.

I remain your sincere friend,

W. H. BAZING.

P. S.—Five inches is the size of the mare's foot.

Hertford, July 30th, 1824.

My dear Friend,

I am sorry that I have delayed so long writing to thee, on the subject of the jointed shoe, but several circumstances have occurred to prevent my sooner addressing thee. As I have used these shoes more than three years on one horse, thou wished me to give thee my opinion on this subject. In consequence of my conversing sometimes about shoeing, I have had opportunities of seeing several kinds, all of which I have been informed will prevent contraction, but these are evidently illusive ideas, as the shoes are formed of a solid ring, which, when fastened on a body capable of expanding and contracting must prevent its natural action. It is my decided opinion that contraction from shoeing cannot take place under the use of thy jointed shoe. My mare was five years old when I bought her, and of course had been shod some time, and, judging from the shape of the hoofs, contraction had already begun, —a pattern of the hoof was taken, and on comparing it with the hoof at the present time, no further contraction has occurred. I have generally used thy shoes, but when I have used the common kind, I find she does not step out so freely as when shod with the jointed. In the country I find some difficulty in having them put on properly, and unless the owner of the horse is present, a farrier will often use nails with too large a body, and thus endanger splitting the wall or perhaps cut the sole and frog, or with the view of increasing the beauty of nature, rasp away the external covering of the wall, which no doubt is as useful to the horse's foot as the cuticle is to the cutis in the human subject. Thy shoes wear much longer than the common shoe, and I particularly noticed how long the first pair lasted, which I think was three months, and then a fresh piece of steel was added to the toe, and they were worn one month longer. My mare treads remarkably even, which may in some measure account for the length of time.*

I am thy obliged friend,

RICHARD SHILLITOE.

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* It has been this valuable property that has occasioned these shoes to be much abused. Editor.

My dear Friend,

It is with pleasure that I bear testimony to the great advantages of the Expansion Tablet Shoe, having used it for about two years, till I lost the horse by an accident from the kick of another horse, and by which shoeing his feet and manner of going were improved in a remarkable degree.

ABRAHAM LINGHAM.

Edmonton, June 18, 1823.

THE TESTIMONY OF WM. SMITH, ESQ. REGENT'S PARK.

Dear Sir,

I think it but justice to you to say, that my horse, a light cart horse, was dreadfully lame from ring bones, so much so, that I was inclined to sell him for any thing he would fetch. Since he has been shod with the Expansion Shoes, he has done his work remarkably well, without once being lame since he had them, and is to me a very useful horse, and is well worth £40. I have also shod a gig horse and a saddle horse with Expansion Shoes, with evident advantage to their going.

I am, dear Sir, with great respect,
Your's most truly,
W. SMITH.

TO CHARLES CLARK, SIDMOUTH MEWS, GRAY'S-INN LANE.

Coggeshall, 12th mo. 6th, 1827.

Dear Friend,

For the last three years we have shod twenty horses, used in all capacities, somewhat upon the expansion system, so much and justly recommended by thy uncle Bracy Clark. The shoe we use is but the common shoe in shape, nailed across the toe and *on one side only*, which not only admits of the natural expansion of the foot, but costs no more than the common shoe. By this system we have been enabled to use many horses, which by the usual mode of shoeing, had become so contracted in the feet as to be useless on the road. In consequence of our horses' feet doing so well under this system, many of our more enlightened neighbours have been induced to adopt it, and also very much approve the system; and at no distant period we do expect this mode of shoeing upon the principle of expansion must and will supersede all others. Any use thee or thy uncle may feel inclined to make of the above, will meet with my sanction.*

J. V. BRIGHTWEN.

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* Having a professional call to Coggeshall on other business a few months ago, I visited this stable of horses, which are draft horses chiefly, used for carrying out the beer, and the round and beautiful form of their feet, the soundness of the frogs, not one being suffered ever to be cut, and their firm and wholesome appearance surpassed any thing I had ever before seen, and I believe may challenge the United Kingdom to show so uniformly at least, in all these respects, the like in a stable so numerous. Edit.

MR. BLOXAM ON MR. BRACY CLARK'S PRINCIPLES OF VETERINARY SHOEING.

To the Editor of THE LANCET.

SIR,

From a fifteen years' intimate acquaintance with the doctrines and principles of Mr. BRACY CLARK, I feel perfectly justified in stating, that the views he has of the structure of the horse's foot, and of shoes suited to that structure, are perfectly correct, true, and necessary; and that time only, and more extended practice, (for reasoning there is none to oppose them,) are wanting, to make these principles generally admitted by the world. As far as army or regimental rules would permit, I have constantly adhered to this gentleman's directions in my practice, and can proudly say, in support of them, that in no regiment were the horses' feet in better condition than in the 1st Life Guards.

In order to prevent, in some degree, the mischievous consequences which inevitably result from the use of the common prison shoe, I have for many years caused the young horses under my care to be shod with small tips only, until four years old.

The EXPANSION SHOE, being a discovery of more recent date, is not yet introduced into the British Army; so that I can only bear this general testimony to the truth of those principles, which make such a mode of defence imperative to the perfect well-being of that beautiful and elastic organ, the horse's foot.

Your obedient Servant,

SAMUEL BLOXAM,

Thirty years Vet. Surgeon, 1st Life Guards.

TO BRACY CLARK, 7, TAUNTON PLACE, REGENT'S PARK.

Berkhampstead, 1st mo. 8th, 1824.

I suppose my friend Bracy Clark will be almost ready to think I have been unmindful of his kindness respecting my horse, but I can assure him that is not the case; I was desirous of ascertaining fully the utility of the expansion shoe, before I said much about it, and I think I may now state that with respect to my horse I have effectually proved their value, for before I used them I had almost made up my mind to destroy the horse, not liking to part with him, as being a valuable old servant, for I knew that if he was not fit for my service, which is a comparatively easy place for a horse, he would not be very suitable for any other; in this state I applied to thee as a last resource, and I am glad to find it has succeeded beyond my expectation; he now sets his feet firmly on the ground, and since the first day that he had the expansion shoe put on, I do not recollect that he has gone lame, but has continued to improve in going, and appears to go in every respect more pleasantly to himself and much more so to the driver. I have attended particularly to thy instructions respecting his hoofs, and have not had them pared since, and I doubt not they are much better for it.

I did not like to trouble thee with the shoe that broke, as my blacksmith's son (who is an ingenious young man) seemed to wish to repair it, and thought he could do it very well. I suffered him to undertake it, and I find he has done it very well; he has also made one on the expansion principle, which likewise answers the purpose very well, and he seems desirous of giving satisfaction therein.

I had intended to have been in town before this time, but my engagements have prevented me; when I come I intend giving thee a call, in the mean time, I remain

Thy sincere friend,
THOMAS SQUIRE.

Two years after I received the following note from the same gentleman:

Berkhampstead, 8th mo. 16th, 1826.

THOMAS SQUIRE will be obliged by his friend Bracy Clark furnishing him with two pair of shoes like the one sent, as he finds no other shoe will prevent his horse remaining lame.

36, *Stamford St. Blackfriars, December* 31, 1827.

DEAR SIR,

I feel happy in bearing testimony to the very great advantage of your expansion shoe, over that of the common one, which has been proved in the following instance. My thoroughbred horse, Napoleon, became very much contracted in the feet, in consequence of having been kept shod for two years and a half, (mostly in the stable) without being used, during the time that I was confined in Ilchester gaol; at this time he was rising six years old, and having done but very little work, in all other respects he was quite in his prime. Finding that from the numbness of his feet he became unsafe to ride, and unpleasant to drive, in consequence of very severe cutting, I was induced to send him always to the veterinary college to have him shod, still he got worse and worse, his fetlock joints became much enlarged and callous, from the constant battering of his feet against his legs, and in spite of the wadded boots which he constantly wore, he seldom returned from his work without his legs being in a gore of blood, and at length, by the *speedy cut*, he became so lame, as to be totally unfit for use; being a favorite, I sent him repeatedly to the veterinary college, where he remained for a month or six weeks at a time, without obtaining the desired relief, and Mr. Sewell recommended me to dispose of him as useless. Accident threw me in your way, and you recommended the expansion shoe, which was immediately tried with success; before he had worn the first set of shoes half out, he was so much relieved as entirely to get rid of the cutting. He has been now shod with your expansion shoe twelve months, during which time he has been in constant work in my vans over the stones in London, has never cut since, and is now as sound and with as good feet as he had when he was three years old, and instead of being totally useless, he is now, (solely owing to your shoeing) the most useful and valuable horse I have.

I am, dear Sir, yours very sincerely,
HENRY HUNT.

P. S. When I related this case to Mr. Sewell, he admitted that the expansion shoe was the perfection of shoeing, if it could be made to keep on as well as the common shoe. In this you have

now completely succeeded: since you have shod my horse I find the shoes remain on firm till they are worn out, although my horse goes over the stones of London, with a heavy load, four days in a week on a average, from twenty to thirty miles a day. The shoes he has on now, have been in wear upwards of five weeks.

To Mr. C. Clark, Sidmouth Mews, Gray's-inn-lane.

Besides the miserable consequences of the common shoe upon the foot, pointed out in my works, I am satisfied also that a very large share of the untowardness and vicious dispositions in horses, may be attributed to the miserable pains and condition of their feet, and what can be more natural than that continual suffering should produce such effects. The following extract of a letter not intended by the writer for publication, will confirm and illustrate this fact; it was written from Pangbourne, Sep. 6, 1821.

"When I last had the pleasure of your company, I mentioned to you that I was obliged to put a pair of fetters (that is common shoes) on my horse, from being out of the expansion shoes, and the following is the result of four or five days' wear, after which I went to London: great sluggishness and disinclination to travel, which was noticed both by my uncle and myself; and if forced by the whip to mend his pace, I observed the scapulæ to rise alternately above the withers, as if he intended to shift the weight of his body from his feet to his shoulder, but the mended pace almost immediately degenerated into a shuffling trot; he also went very much off his appetite, almost refusing both hay and corn; but which returned, without any administration of medicine, upon replacing the expansion shoes; whether the latter circumstance arose from pain in his feet, I am not able to determine, but my uncle witnessed it with myself.* Mrs. B. and my uncle present their best respects, and very sincerely, I remain

Your friend,

W. H. BAZING.

Sir,

Having a Gig-Horse much given to tripping, I was lately induced to make a trial of your Expansion Shoes, and I beg now (as an act of common justice) to offer my testimony of their superiority over those in common use. Though an aged horse, (and therefore not the best qualified to do justice to the invention,) he can now trot down hill with considerable ease and safety,—whereas before the above trial, it was scarcely prudent to trust him beyond a walk down even the smallest declivity. On level ground too he goes with much more freedom; and, what I think of some importance, his feet, after a moderate journey, are now cool and comfortable, instead of being hot and inflamed, as they used to be, under similar circumstances.

You are welcome to make what use you please of this communication from,

Sir, &c. &c.

H. J. HILL, *Great Portland Street.*

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* My own mare I sold to a gentleman in 1820, in common shoes; she so tripped and tumbled with him, that he sent her back to me as too dangerous to ride. I had her shoes taken off, and Expansion Shoes put on; her manner of going was so improved, that it became delightful to ride her, and from a fretful, sour, unpleasant disposition, she became gay and cheerful. Editor.

Several of these cases, if they had been taken to our present Veterinary College, would have been pronounced *foundered*, though only with simple contraction in a distressing degree, and then the abominable operation of nerving would have next been proposed for them, of which we shall have to give some day a more extended account. —It would not have been difficult to have produced more than double the number of these testimonies, if such proof was deemed necessary, but we believe they would rather encumber and tire, than assist in proving the utility of this discovery. If these proofs will not be received, neither will thousands;—thus we abstain, for the present at least, from further addition in this respect.

In order to bring these shoes, upon the new principle, within a moderate expence, (without which one could hardly hope for their being generally adopted,) a more than usual share of pains, labor, and expence, was used in finding out the readiest way of forming them from the bar iron, and of which process we propose to give an insulated account in the following subjoined essay, reserving nothing,—so that to the practical mechanic, who does not care much about elements or principles, this part of our essay will have the greatest interest,—and by which this desirable object has been so far obtained that many smiths could make them in a very little more time than in making the common circle shoe. Notwithstanding this however, I propose to conclude this account with observations on making them with the new nealed cast iron. At first we are aware a decided prejudice will obtain against this proposition, as was for some time our own feeling; but every well arranged experiment has served more and more to convince us of its practicability, and we entertain no doubt now on the subject.—(For I have understood he lost his patent rights through the interference of some Birmingham people.)—This new metal, or singular preparation of iron, I have been induced from justice to its patentee, the late *Samuel Lucas*, of Brampton, near Leeds, (who, if he was not the inventor, was probably the first who really understood its value sufficiently to induce him to take out a patent for it,) to call it the Brampton metal, to avoid circumlocution. It appears that this extraordinary product of cast iron, of which we shall give a more circumstantial account, is formed by exposing the metal to a high temperature, for a very long time, sometimes weeks, the air being cautiously excluded,—by which it is ridded of a numerous host of casual matters, with which it is combined;—as the *phosphurets*, *sulphurets*, and *silex*, and other admixtures; and is thereby brought into a very malleable and flexile state for things requiring simple wear; and, contrary to our belief, we have used it with general satisfaction, often finding that the shoes wear to the very last degree of thinness, without breaking, and which metal will ultimately bring them within the price of the common shoe; be this as it may, a paltry consideration in the price, for truly paltry it will be, will not, one should imagine, be a momentary consideration with a magnanimous nation, where so noble an object is at stake.

Any communication tending to confirm and encourage this new shoeing, or orders for shoes from persons desirous to take advantage of the present improved state of the art, may be addresssd (post free) to my nephew, Charles Clark, Sidmouth-mews, Gray's-inn-lane, nearly opposite Cubitt's extensive building premises, where they will be duly attended to. Edit.